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Abstract

This study supplementing a 1967 study of Arizona State University, recommends preliminary plans for the design of a national training center capable of accommodating 2,200 fliers and aviation technicians and the steps that should be taken to complete the facility by September 1972. Specific recommendations are: (1) negotiations between the Aviation Research and Education Foundation and the Gela River Indian Community for the leasing of land, and between the Foundation and the Williams Air Force Base for access to a site for engineering studies until the Air Force releases the site, (2) initiation of action by the foundation for site development and construction of flight facilities to permit training operations by September 1969, (3) initiation by the university of action to permit operation of academic and residential facilities by September 1970, and (4) finalization of the financial plan and solicitation of funds from the appropriate agencies. Major sections treat educational objectives, facilities requirements, site development, and financial planning. Extensive drawings are included. (JK)

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Preliminary Design Study of A National Program for Training Skilled Aviation Personnel

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U. S. DEPARTMENT OF COMMERCE
Economic Development Administration

ED034030

PRELIMINARY DESIGN STUDY OF
A NATIONAL PROGRAM FOR
TRAINING SKILLED AVIATION PERSONNEL

prepared by

Arizona State University

for the

Economic Development Administration

This technical assistance study was accomplished by professional personnel under contract with the Economic Development Administration. The statements, findings, conclusions, recommendations, and other data in this report are solely those of the contractor and do not necessarily reflect the views of the Economic Development Administration.

July 1968

U.S. DEPARTMENT OF COMMERCE
C.R. Smith, Secretary

Ross D. Davis, Assistant Secretary
for Economic Development

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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FOREWORD

As the growth and complexity of the Nation's aviation industry continue to accelerate at an unprecedented pace, so too does the burden of providing an adequate number of trained pilots and technicians.

This study recommends preliminary plans for the design of a national training center capable of accommodating 2,000 fliers and aviation technicians and the steps that should be taken to complete the facility by September 1972.

The report was prepared by Arizona State University and sponsored by the Economic Development Administration. It supplements a study completed by the university in August 1967 recommending the establishment of a national training center.

The earlier study, also commissioned by EDA, predicted a continuation of the spectacular growth of civil aviation and the constant effort needed to maintain a plentiful supply of skilled air and ground personnel to meet industry requirements.

Ross D. Davis

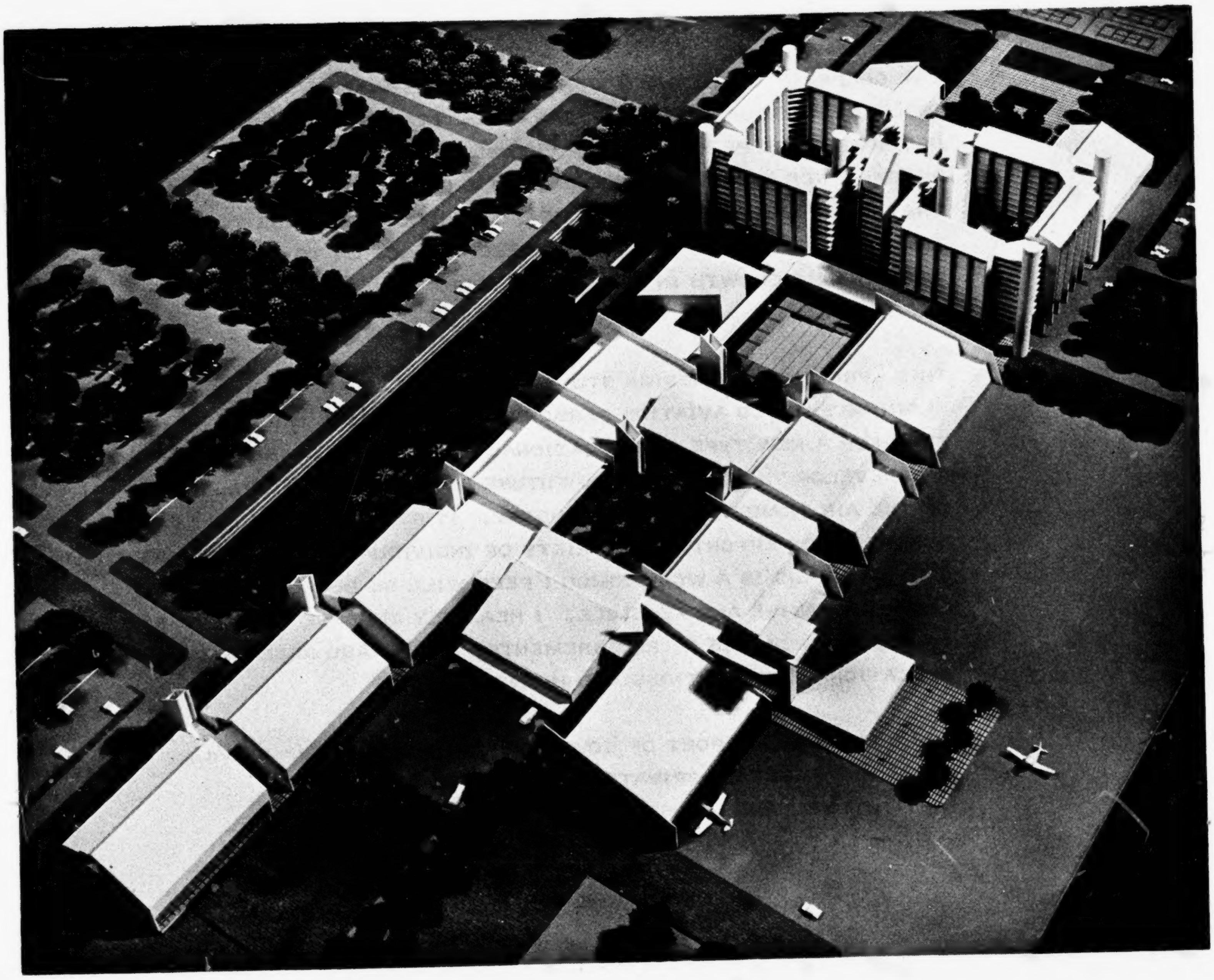
Ross D. Davis
Assistant Secretary of Commerce
for Economic Development

THE COOPERATION BETWEEN VARIOUS LEADERS IN THE AVIATION INDUSTRY AND OUR RESEARCH TEAM IN DEVELOPING "A STUDY TO DETERMINE THE FEASIBILITY OF ESTABLISHING A NATIONAL PROGRAM FOR TRAINING SKILLED AVIATION PERSONNEL" HAS BEEN GRATIFYING AND REWARDING. THE TREMENDOUS RESPONSE TO THE STUDY CONFIRMS THE URGENT NEED FOR ACTION TO MEET THE DYNAMIC GROWTH IN REQUIREMENTS FOR SKILLED AVIATION PERSONNEL.

THIS "PRELIMINARY DESIGN STUDY OF A NATIONAL PROGRAM FOR TRAINING SKILLED AVIATION PERSONNEL" PRESENTS A MASTER PLAN FOR A NEW TYPE OF EDUCATIONAL FACILITY TO RESEARCH AND DEVELOP THE CURRENT AND FUTURE EDUCATIONAL REQUIREMENTS OF THE AIR TRANSPORTATION INDUSTRY. IT REPRESENTS THE SYNTHESIS OF EFFORT OF A VARIETY OF INDIVIDUALS AND CORPORATE EXPERTISE AND IS A WORK WHICH I FEEL WILL BE RECOGNIZED AS BOTH INNOVATIVE AND FEASIBLE. I HEARTILY ENDORSE THE CONCEPT OF THE INTERCHANGE OF REQUIREMENTS, IDEAS, AND RESEARCH BY EDUCATIONAL INSTITUTIONS AND INDUSTRY.

THE CONTINUED SUPPORT OF GOVERNMENTAL AGENCIES -- LOCAL, STATE AND FEDERAL; PRIVATE FOUNDATIONS; EDUCATIONAL INSTITUTIONS; AND INDUSTRY IS ENCOURAGED.

G. HOMER DURHAM
PRESIDENT
ARIZONA STATE UNIVERSITY



AERIAL VIEW OF SCALE MODEL FROM THE SOUTHWEST

PROMINENT FEATURES: HIGHRISE DORMITORIES IN THE BACKGROUND, FLIGHT TRAINING CENTER CENTER IN THE FOREGROUND AND INDUSTRY RESEARCH CENTER AT THE LOWER LEFT CORNER.

I. INTRODUCTION

IN JULY, 1967, THE ARIZONA STATE UNIVERSITY COMPLETED "A STUDY TO DETERMINE THE FEASIBILITY OF ESTABLISHING A NATIONAL PROGRAM FOR TRAINING SKILLED AVIATION PERSONNEL". THIS STUDY WAS CONDUCTED AS A TECHNICAL ASSISTANCE PROJECT UNDER THE SPONSORSHIP OF THE ECONOMIC DEVELOPMENT ADMINISTRATION, U. S. DEPARTMENT OF COMMERCE.

BRIEFLY, THE STUDY DETERMINED:

(1) AN URGENT NEED FOR SUCH A PROGRAM;
(2) THAT SUCH A PROGRAM IS FEASIBLE;
(3) THAT ARIZONA PROVIDES AN IDEAL LOCATION FOR AN AVIATION TRAINING CENTER, PARTICULARLY WITH RESPECT TO THE FLIGHT TRAINING ASPECTS;
(4) THAT THE ECONOMIC IMPACT ON THE AREA, PARTICULARLY THE GILA RIVER INDIAN COMMUNITY, WOULD BE ENORMOUS; AND
(5) THAT THE PRIMARY GOAL OF THE AIR TRANSPORTATION TRAINING CENTER SHOULD BE TO RESEARCH AND DEVELOP IMPROVED AND CREATIVE AVIATION CURRICULA AND SYSTEMS FOR IMPLEMENTATION NATIONALLY IN OTHER AVIATION EDUCATIONAL INSTITUTIONS.

UPON COMPLETION OF THE STUDY, THE ECONOMIC DEVELOPMENT ADMINISTRATION AMENDED THE CONTRACT TO PROVIDE ADDITIONAL FUNDS FOR CONDUCTING A PRELIMINARY DESIGN STUDY OF A NATIONAL CENTER FOR TRAINING SKILLED AVIATION PERSONNEL.

DURING THE PROCESS OF THESE STUDIES, CONSIDERABLE ENTHUSIASM AND VALUABLE SUPPORT HAS BEEN GENERATED IN THE AVIATION INDUSTRY. THIS ENTHUSIASM HAS BEEN DEMONSTRATED BY THE ESTABLISHMENT OF A NON-PROFIT ORGANIZATION, THE "AVIATION RESEARCH AND EDUCATION FOUNDATION". LEADERS IN A VARIETY OF AVIATION AND OTHER BUSINESS ENDEAVORS ARE REPRESENTED IN THIS FOUNDATION. THE FOUNDATION HAS INITIATED ACTION TO EXPAND ITS MEMBERSHIP AND OBTAIN FUNDS FOR FURTHERING THE ESTABLISHMENT OF THE AIR TRANSPORTATION TRAINING CENTER. EQUAL ENTHUSIASM AND SUPPORT BY THE APPROPRIATE AGENCIES OF STATE AND FEDERAL GOVERNMENT, PLUS THE SUPPORT OF PRIVATE FOUNDATIONS, CAN MAKE THE ARIZONA STATE UNIVERSITY AIR TRANSPORTATION TRAINING CENTER A REALITY.

TABLE OF CONTENTS

I. INTRODUCTION vii

II. EDUCATIONAL OBJECTIVES 1

- A. EDUCATIONAL PHILOSOPHY 1
- B. STUDENT POPULATION CHARACTERISTICS 5
- C. PROGRAM FEATURES 7
- D. DESIGN CRITERIA 13
- E. THE ELEMENTS OF DESIGN 22
- F. RESEARCH SUMMARIES 37

III. FACILITIES REQUIREMENTS 45

- A. DESCRIPTION OF FACILITIES 45
- B. CURRICULUM ANALYSIS 57
- C. FACILITIES BREAKDOWN 79
- D. BUDGET ANALYSIS 89
- E. PLANNING AND CONSTRUCTION SCHEDULE 94

IV. SITE DEVELOPMENT 97

- A. SOIL ANALYSIS AND ENGINEERING REPORT 99
- B. DESCRIPTION OF ELECTRICAL AND COMMUNICATION SYSTEM 105
- C. DESCRIPTION OF MECHANICAL SYSTEMS - 109
  - WATER
  - SEWER
  - AIR CONDITIONING

V. FINANCIAL PLANNING 113

VI. CONCLUSIONS 121

VII. RECOMMENDATIONS 123

VIII. DRAWINGS

1. REGIONAL MAP
2. COMMUNITY LAND USE
3. SITE ANALYSIS
4. SITE-RELATED FUNCTIONAL DIAGRAM
5. TOPOGRAPHIC SURVEY
6. TOTAL CAMPUS PLAN
7. PHASING
8. CIRCULATION AND PARKING
9. GRADING AND PLANTING
10. BUILDING COMPLEX, FIRST FLOOR
11. BUILDING COMPLEX, SECOND FLOOR
12. DORMITORIES, TYPICAL
13. ELECTRICAL AND COMMUNICATIONS DISTRIBUTION SYSTEM
14. MECHANICAL DISTRIBUTION SYSTEM - AIR CONDITIONING
15. MECHANICAL DISTRIBUTION SYSTEM - WATER AND SEWER

IX. PHOTOGRAPHS

PRELIMINARY DESIGN STUDY
OF
A NATIONAL PROGRAM FOR
TRAINING SKILLED AVIATION PERSONNEL

STUDY TEAM

DR. WALTER E. BURDETTE (PROJECT DIRECTOR)
DIRECTOR, DIVISION OF INDUSTRIAL DESIGN & TECHNOLOGY
ARIZONA STATE UNIVERSITY

VICTOR E. ROTHE (PROJECT CO-DIRECTOR)
RESEARCH ASSOCIATE, DIVISION OF INDUSTRIAL DESIGN & TECHNOLOGY
ARIZONA STATE UNIVERSITY

DR. JAMES L. SCHAMADAN
ASSOCIATE PROFESSOR OF INDUSTRIAL ENGINEERING
ARIZONA STATE UNIVERSITY

N. R. LINCOLN, JR.
STAFF SPECIALIST, DIVISION OF INDUSTRIAL DESIGN & TECHNOLOGY
ARIZONA STATE UNIVERSITY

SUBCONTRACTORS AND CONSULTANTS

PANCOAST/FERENDINO/GRAFTON/ARCHITECTS
2575 SOUTH BAYSHORE DRIVE
MIAMI, FLORIDA

CHOPAS AND STARKOVICH ARCHITECTS
1528 EAST MISSOURI
PHOENIX, ARIZONA

GENERAL LEARNING CORPORATION
5454 WISCONSIN AVENUE, N.W.
WASHINGTON, D. C.

DIVISION OF INDUSTRIAL DESIGN AND TECHNOLOGY
ARIZONA STATE UNIVERSITY
TEMPE, ARIZONA

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THE AUTHORS ARE PARTICULARLY INDEBTED TO THE FOLLOWING ORGANIZATIONS FOR THEIR GENEROUS CONTRIBUTIONS:

ARIZONA PUBLIC SERVICE COMPANY
P. O. BOX 2591
PHOENIX, ARIZONA

CITY OF CHANDLER, ARIZONA

FIRST NATIONAL BANK OF ARIZONA
P. O. BOX 2551
PHOENIX, ARIZONA

JENNINGS, STROUSS, SALMON AND TRASK
111 WEST MONROE
PHOENIX, ARIZONA

MOUNTAIN STATES TELEPHONE COMPANY
P. O. BOX 2320
PHOENIX, ARIZONA

SALT RIVER PROJECT
P. O. BOX 1980
PHOENIX, ARIZONA

VALLEY NATIONAL BANK
P. O. BOX 71
PHOENIX, ARIZONA

EDUCATIONAL PLANNING

THE TEAM CONCEPT . . . . . .

THE MASTER PLAN FOR A COLLEGE CAMPUS IS THE RESULTANT OF AN EDUCATIONAL NEED UNDER THE INFLUENCE OF PROGRAMS AND TECHNOLOGIES AS WELL AS ECONOMIC AND ENVIRONMENTAL FACTORS.

THE AIR TRANSPORTATION TRAINING CENTER FOR ARIZONA STATE UNIVERSITY IS BEING DEVELOPED TO MEET THE TREMENDOUS NEEDS OF THE RAPID-GROWING AIR INDUSTRY.

THE MASTER PLAN FOR THE CAMPUS HAS BEEN DESIGNED BY MERGING THE EFFORTS OF THE EDUCATIONAL PLANNING-ARCHITECTURAL TEAM. IT REPRESENTS A CONTINUOUS PROCESS IN WHICH THE EDUCATIONAL OBJECTIVES AND THE DESIGN CRITERIA HAVE BEEN DEFINED; THE SITE HAS BEEN SELECTED AND THE ECONOMIC FEASIBILITY PROBLEMS AND PROGRAM HAVE BEEN ANALYZED PRIOR TO THE PREPARATION OF DIAGRAMS AND DRAWINGS. IT IS THE WORK OF A TEAM.

OUR ACHIEVEMENTS THROUGH UNDERSTANDING AND COLLABORATION BETWEEN ARIZONA STATE UNIVERSITY, THE EDUCATIONAL PLANNING-ARCHITECTURAL TEAM, AND THE LOCAL, STATE, AND FEDERAL AGENCIES ARE EXPRESSED IN THE FOLLOWING PAGES.

II. EDUCATIONAL OBJECTIVES

A. EDUCATIONAL PHILOSOPHY

THE EDUCATIONAL PHILOSOPHY HOPED TO BE ACHIEVED IN THE PROPOSED AIR TRANSPORTATION TRAINING CENTER IS A COMPROMISE BETWEEN THE SOLELY CULTURAL AND ACADEMIC ASPECTS OF THE EARLY UNIVERSITIES AND THE STRICTLY COMMERCIAL ASPECTS OF SOME OF OUR MODERN INSTITUTIONS. WE HOPE TO COMBINE THOSE CULTURAL QUALITIES OF THE OLDER PHILOSOPHY, WHICH ENRICH AN INDIVIDUAL'S DAILY LIFE, WITH THE VOCATIONAL/TECHNICAL QUALITIES OF THE LATTER WHICH PERMIT THE INDIVIDUAL TO BECOME A PRODUCTIVE CITIZEN.

ONE GREAT CHALLENGE TO EDUCATION TODAY IS THE DEVELOPMENT OF FLEXIBILITY PERMITTING ADAPTATION TO CHANGES. CERTAIN BASIC, TRADITIONAL THOUGHT PROCESSES, SUCH AS LOGIC, DEDUCTION, EXPRESSION, ETC., ARE FAIRLY CONSTANT AND MUST BE MASTERED. HOWEVER, OUR WORLD IS CHANGING SO FAST THAT, IN MANY AREAS OF KNOWLEDGE - ESPECIALLY IN THE ENGINEERING SCIENCES - WHAT IS NEW TODAY MAY BE OBSOLETE IN A MATTER OF A FEW YEARS OR EVEN MONTHS. ONLY THE MIND EDUCATED TO ADAPT TO CHANGE CAN COPE SUCCESSFULLY WITH THE CHANGING WORLD OF TODAY.

THE CHANGES IN AIR TRANSPORTATION IN JUST THE LAST TEN YEARS ARE STAGGERING. FACILITIES, PERSONNEL, AND OPERATIONS HAVE BEEN HARD PRESSED TO KEEP PACE WITH THE TREMENDOUS GROWTH. THE CHANGES EXPECTED IN THE NEXT TEN YEARS ARE ALMOST BEYOND COMPREHENSION. WE MUST PREPARE FOR THESE CHANGES.

THE EDUCATIONAL OBJECTIVE OF THIS PROGRAM IS TO PRODUCE BROADLY EDUCATED PERSONNEL, AMENABLE TO CHANGE, WHO WILL BE THE MOST PROFESSIONAL, SKILLED AVIATION PERSONNEL POSSIBLE, UTILIZING CONTINUOUS RESEARCH AND DEVELOPMENT IN EDUCATIONAL TECHNOLOGY ORIENTED SPECIFICALLY TO AVIATION CURRICULA. AS SUCCESSFUL CURRICULA AND EDUCATIONAL TECHNIQUES ARE DEVELOPED, THEY WILL BE MADE AVAILABLE TO OTHER EDUCATIONAL INSTITUTIONS INTERESTED IN AVIATION EDUCATION.

IN ORDER TO ACHIEVE THIS OBJECTIVE, IT IS BELIEVED THAT:

1. THE PROGRAM MUST BE BOTH TECHNICAL AND GENERAL IN NATURE, SO THAT THE STUDENT MAY DEVELOP AN ECONOMIC PROFICIENCY AND AN EQUAL PERSONAL AND ACADEMIC PROFICIENCY, IN ORDER THAT HE CAN ENGAGE IN A MEANINGFUL AND REMUNERATIVE OCCUPATION AND CAN ENJOY THE FRUITS OF THIS OCCUPATION IN HIS RELATIONS WITH OTHER PEOPLE AND WITH HIS LEISURE TIME.

2. THE PROGRAM MUST BE DYNAMIC, RATHER THAN STATIC, WHICH IS TO SAY IT MUST OPERATE TO ACCOMMODATE CHANGES IN INDUSTRY NEEDS, STUDENT NEEDS, AND TEACHING PROCESSES. IT MUST ANTICIPATE CHANGE AND FORECAST ITS OWN ALTERNATIVE RESPONSES.

3. THE PROGRAM MUST BE ORGANIC, RATHER THAN FRAGMENTED. THERE MUST BE A HIGH DEGREE OF CONSISTENCY IN THE CHOICES EXERCISED IN COORDINATING VOCATIONAL AND GENERAL EDUCATIONAL REQUIREMENTS.

4. THE PROGRAM MUST BE TECHNOLOGICAL-SCIENTIFIC. IT MUST BE ABLE TO TAKE ADVANTAGE OF THE SPEED AND MASS OF DATA MANIPULATION, AND THIS ADVANTAGE MUST BE APPLIED WITHIN THE FRAMEWORK OF SOPHISTICATED, EXPERIMENTAL APPROACHES TO MYRIAD, VARIED REQUIREMENTS. IT MUST GENERATE NEW THEORETICAL CONSTRUCTS, RATHER THAN DEPEND UPON TRADITIONAL AND/OR ARGUMENTATIVE DIRECTIVES FOR DEALING WITH OLD CONSTRUCTS. IT MUST PROVIDE FOR BREADTH, AS WELL AS FOR DEPTH, AND MUST ACCOMPLISH A DISTINGUISHABLE CHANGE OF ABILITY AND BEHAVIOR IN STUDENTS TO PREPARE THEM FOR THE MORE COMPLEX ROLES IN AN EXPANDING SOCIETY.

5. THE PROGRAM MUST BE HIGHLY PERSONAL, RATHER THAN AUTOCRATICALLY EXPEDIENT. IT MUST BE LEARNER-CENTERED, RATHER THAN CURRICULUM-CENTERED, PROCESS-CENTERED, OR TEACHER-CENTERED. IT MUST RELATE TO CURRENT PSYCHOLOGICAL KNOWLEDGE CONCERNING LEARNING THEORY AND MENTAL HEALTH AND MUST EMPHASIZE STUDENT ACHIEVEMENT AND ALLOW FOR PROGRAM CHANGE WITHOUT UNDUE STRESS OR LOSS OF TIME FOR THE STUDENT.

B. STUDENT POPULATION CHARACTERISTICS

THE INITIAL CLASS IS EXPECTED TO NUMBER ABOUT 1,000 AND THE CURRENT PLANNING IS FOR 2,000. THESE STUDENTS WILL BE OF VARIED AGES AND BACKGROUND, AND WILL BE PREDOMINANTLY MALE, THOUGH SOME FEMALE PARTICIPANTS AND WIVES MUST BE PLANNED FOR. IT IS ASSUMED THAT AT ANY GIVEN TIME ONE-FOURTH OF THE STUDENTS ENROLLED WILL BE IN FLIGHT TRAINING, AND THE REST WILL BE IN NON-FLIGHT OPERATIONS, OR IN TECHNOLOGICAL PROGRAMS. STUDENT GROUPINGS ARE EXPECTED TO VARY RADICALLY FROM THE TRADITIONAL GROUP SIZES, AND WILL BE DETERMINED ON THE BASIS OF THE PROCESSES (OPERATIONS TO BE PERFORMED IN THE TEACHING-LEARNING SITUATION), RATHER THAN UPON THE TEACHER-STUDENT-TIME BASIS. THUS, WE MAY GENERALIZE THAT STUDENTS WILL BE GROUPED AS FOLLOWS:

1) DEALING WITH "THINGS" INDIVIDUALLY OR IN SMALL GROUPS AS THEY WORK IN LABS WITH AIRCRAFT EQUIPMENT, TRAINERS, METERS AND OTHER INSTRUMENTS.

2) DEALING WITH IDEAS AND PEOPLE.

    A) LARGE GROUPS OF UP TO SEVERAL HUNDRED FOR LECTURE AND MASS MEDIA PRODUCTIONS, INTRODUCTORY STATEMENTS, AND TERMINAL EVALUATIONS.

    B) MEDIUM SIZE GROUPS OF UP TO 15 FOR DISCUSSION, PRODUCTION OF PROJECTS AND INTERMEDIATE EVALUATION.

    C) INDIVIDUAL STUDENTS WORKING WITH AUTOMATED AND NON-AUTOMATED MATERIAL AT THEIR OWN PACE.

C. PROGRAM FEATURES

CURRICULUM OFFERINGS DEMAND THAT COURSES OF STUDY DEALING WITH SPECIFIC BODIES OF KNOWLEDGE REQUIRED FOR CERTIFICATION OR EMPLOYMENT IN SPECIFIC JOBS WITHIN THE AIR INDUSTRY MUST DOMINATE THE PROGRAM. IN ADDITION, COURSES DEALING WITH OTHER CONTINGENT JOBS WITHIN THE INDUSTRY, SPECIFIED COURSES OF A GENERAL EDUCATIONAL NATURE AND ELECTIVE COURSES OF INDIVIDUAL STUDENT CHOICE SHOULD ALSO BE PROVIDED, ALONG WITH COURSES CONSTRUCTED WITH AN INTERROGATIVE VIEW AS TO KIND AND QUANTITY OF INFORMATION SKILLS AND ATTITUDES REQUIRED. THESE COURSES ARE NOT CONSTRUCTED TO BE LIMITED BY SOME "CLASS TIME" PRESCRIPTION.

MODULARIZED, INDIVIDUALIZED SCHEDULES REPLACE THE TRADITIONAL TIME SCHEDULE, AND STUDENTS PERFORM BY INDIVIDUAL CONTRACTS TO VARIOUS INSTRUCTORS, RATHER THAN PERFORM ACCORDING TO PAST SCOPE-AND-SEQUENCE MOLDS. INTERACTION BETWEEN STUDENT AND INFORMATION IS TWO-WAY, AND THE MEDIA AND PROCESS BECOME AS IMPORTANT TO THE OUTCOME AS THE MATERIALS THEY CONVEY. THIS CONTRASTS SHARPLY WITH THE UBIQUITOUS, PASSIVE STUDENT LISTENING INTERMITTENTLY TO (OR WATCHING) MATERIALS SELECTED FOR HIM WITHOUT REGARD TO HIS INTERESTS OR NEEDS OVER A PERIOD OF TIME WHICH EXCEEDS HIS ATTENTION SPAN, EVEN UNDER OPTIMAL CONDITIONS, AND TO WHICH HE CANNOT RESPOND WHEN HE IS EITHER OFFENDED OR CHALLENGED, BUT CAN ONLY RETURN (FOR REWARDING OR PUNISHING EVALUATION) BY A PROCESS OF PERISTALTIC REVERSAL.

TEACHERS AND STUDENTS WILL TEND TO INTERACT ON AN ADVISORY BASIS MORE AT THE CALL OF THE STUDENT THAN AT THE WHIM OF THE TEACHER. INSTRUCTORS WILL TEND TO LEAD AND ASSIST, RATHER THAN TO FEED AND INSIST. THESE PROGRAM CONSIDERATIONS DETERMINE CERTAIN CHARACTERISTICS OF THE ARCHITECTURAL PROBLEM OF DESIGNING FACILITIES AND MATERIALS AND SUPPLIES:

1) SINCE "CLASS TIME" WILL NOT BE DEFINED BY HOURS AND MINUTES, BUT BY RANDOM REQUIREMENTS, SPACE IS LARGELY AMORPHIC, AND UNDIFFERENTIATED AND WHERE DEFINED FOR SPECIFIC REQUIREMENTS, AS IN THE LABS, IT IS FLEXIBLE ENOUGH FOR CONVERSION OR READAPTABILITY. SPACE OCCURS WITH RELATION TO SIZE OF GROUP, ITS STUDENT MODULE, AND TYPE OF ACTIVITY, RATHER THAN BY DEPARTMENTAL OR CLASS RELATIONSHIPS AS IS FOUND IN TRADITIONAL COLLEGES.

2) SINCE TIME AND SPACE ARE RELATED MORE TO STUDENT DEMAND THAN TO INSTITUTIONAL CONVENIENCE, AND SINCE STUDENTS WILL ASSUME MAJOR RESPONSIBILITY FOR THEIR RATE OF PROGRESS AND THE WAY THERETO, LIVING QUARTERS HAVE BEEN DESIGNED TO ALLOW THE STUDENT BOTH SPACE AND MATERIAL WITH WHICH TO PURSUE HIS STUDIES.

3) SINCE RAPID AND RANDOM ACCESS TO COMPREHENSIVE AMOUNTS AND KINDS OF INFORMATION IS INDICATED, MULTI-MEDIA STORAGE AND RETRIEVAL SYSTEMS WILL BE PROVIDED WITH THE CONCOMITANT DEVELOPMENT OF CONDUIT AND POWER OUTLETS, FURNITURE AND EQUIPMENT FOR COMPUTERIZED DATA PROCESSING SYSTEMS, DIAL-ACCESS AUDIO-VIDEO, LIVE AND CANNED SYSTEMS, PUBLIC ADDRESS AND INTER-COM SYSTEMS, LIMITED ACCESS AND SPECIFIC LOOP COMMUNICATION SYSTEMS, MULTI-MEDIA CONSOLES, STUDENT-TEACHER RESPONSE SYSTEMS, TEACHING MACHINES, PROGRAMMING CONTROLS, REMOTE SOURCES, MICROFILMING, READING AND REPRODUCTION SYSTEMS AND MATERIALS, SUPPORT AND PRODUCTION CENTERS.

OUTLETS FOR MULTI-MEDIA AND AUDIO SOURCES ARE PROVIDED IN LARGE-GROUP AREAS, COMMUNICATIONS SYSTEMS OUTLETS IN ALL AREAS, COMPUTER TERMINALS IN SELECTED AREAS, AND AUDIO-VIDEO OUTLETS IN LAB CARRELS, LIBRARY CARRELS AND RESIDENCE CARRELS. CONDUIT IS PROVIDED TO ALL INSTRUCTIONAL AND RESIDENTIAL SPACES FOR AV-TV PROGRAMS. CONDUIT FOR COMPUTER CENTERS AND TERMINALS ARE PROVIDED IN ALL DESIGNED COMPUTER ASSISTED INSTRUCTION AREAS, TEACHER WORK AREAS, SPECIAL RESEARCH AREAS, AND IN AREAS WHERE THE FUNCTIONING OF MACHINERY OR ENGINES IS TO BE CONTROLLED OR MONITORED BY COMPUTER.

4) SPACE DISTRIBUTION FALLS INTO TWO DISTICT CATEGORIES:

   A) THE FLIGHT TRAINING SECTION.

   B) THE COMBINATION TECHNOLOGICAL-GENERAL EDUCATIONAL-RESIDENTIAL SECTION.

THE FLIGHT TRAINING SECTION CONTAINS HANGARS, MAINTENANCE SHOPS, SIMULATED TRAINER ROOMS, OPERATIONS CONTROL ROOMS, (CONTROL TOWER) AND INSTRUCTOR OFFICES. THESE SPACES FORM AN OPERATIONAL UNITY AS REGARDS THE REAL FLIGHT PROBLEMS ON AN ACTUAL AIR FIELD, HOWEVER, THIS SECTION IS DESIGNED SO AS NOT TO BE DIVORCED FROM THE LIBRARY, CARREL AREAS, ETC., WHICH COMPLETE ITS IDENTITY AS A PART OF THE INSTRUCTIONAL PROGRAM. THE GENERAL EDUCATION AND TECHNOLOGICAL SPACES FORM A NATURAL MARRIAGE, HAVING SIMILAR REQUIREMENTS AND MUTUAL PURPOSES.

THE INTEGRATION OF THE RESIDENTIAL SPACE WITH THE ACADEMIC SPACES RESULTS IN THE FOLLOWING ACHIEVEMENTS.

1) THE INDIVIDUAL LAB CONCEPT IS EXTENDED TO EVERY STUDENT IN HIS ROOM AND REDUCES THE REQUIREMENTS FOR SUCH SPACE IN THE TOTAL AREA.

2) EATING FACILITIES LOCATED ADJACENT TO BOTH CLASSROOM SPACE AND LIVING QUARTER SPACE DOUBLE FOR USE AS MULTIPLE SMALL GROUP SPACES.

3) INFORMAL LOUNGE SPACE PROVIDED FOR LIVING AREAS DOUBLE AS PLEASANT, EFFECTIVE READING AREAS FOR STUDENTS.

A LISTING OF SPACES IN THIS SECTION INCLUDE:

1) A LARGE GROUP AND MEDIUM GROUP PRESENTATION AREA (DIVISIBLE AUDITORIUM).

2) SMALL GROUP DISCUSSION AREAS.

3) LABORATORIES:

   A) SPECIALIZED GROUP
   B) AUTOMATED, INDIVIDUAL

4) TEACHER WORK SPACES:

   A) OFFICE CONFERENCE
   B) MATERIALS PREPARATION

5) INSTRUCTIONAL MATERIALS CENTER (IMC):

   A) READING ROOM
   B) CARREL AREA
   C) MICROFILMING AREA
   D) TYPING BOOTHS
   E) COLLECTIONS DISPLAY AREA
   F) RESEARCH (REFERENCE AND COLLATERAL INSTRUCTION) AREA
   G) LIBRARIAN'S OFFICE AND PROCESSING SPACES
   H) MAGAZINE AND MICRO STORAGE
   I) AV (COMPONENTS) STORAGE AND REPAIR
   J) AV SYSTEMS CONTROL ROOM
   K) TV STUDIOS AND SUPPORT
   L) COMPUTER AND OTHER DATA PROCESSING SPACES
   M) OTHER MATERIALS PRODUCTION AREAS

6) DINING AREA

7) RESIDENCE ROOMS

8) LOUNGE AND/OR IMC RELATED SPACES

THE LARGE GROUP AND MEDIUM GROUP AREAS CONSTITUTE AN AUDITORIUM SPACE FOR ABOUT 800, WHICH SUBDIVIDE TO PROVIDE SIX ACOUSTICALLY ISOLATED SPACES WITH SEATING FOR 130 STUDENTS EACH.

D. DESIGN CRITERIA

INTRODUCTION

EVERY WORK OF ARCHITECTURE DEPENDS UPON ITS SURROUNDINGS FOR THE VISUAL IMPRESSION WHICH IT CREATES. THOSE SURROUNDINGS ARE MADE UP OF SITES AND BUILDINGS. TO AN ARCHITECT, A COLLEGE DESIGN IS AN ADJUSTMENT OF THE MYRIAD OF TECHNICAL AND PRACTICAL DETAILS PRODUCING WHAT HE HOPES WILL BE A WORK OF ART. SUCCESS DEPENDS UPON HOW MASTERFUL THE ARCHITECT IS IN CONTROLLING AND MANIPULATING THESE DETAILS, BUT WHEN ALL IS SAID AND DONE THE TOTAL IMPRESSION IS MAINLY DETERMINED BY THE RELATION OF THE BUILDING TO ITS ENVIRONMENT AND THE EXPERIENCE OF THE PEOPLE WHO USE IT.

THE MASTER PLAN FOR A COLLEGE CAMPUS IS THE RESULTANT OF AN EDUCATIONAL NEED UNDER THE INFLUENCE OF PROGRAMS AND TECHNOLOGIES AS WELL AS ECONOMIC AND ENVIRONMENTAL FACTORS. THE AIR TRANSPORTATION CENTER OF ARIZONA STATE UNIVERSITY IS BEING DEVELOPED TO MEET THE TREMENDOUS NEEDS OF THE RAPID-GROWING AIR INDUSTRY.

DESIGN CRITERIA FOR EDUCATIONAL FACILITIES HAVE BEEN STRONGLY AFFECTED IN RECENT YEARS BY CHANGES IN THE PATTERN OF TRANSPORTATION ROUTES AND URBAN GROWTH. EDUCATIONAL FACILITIES ARE BECOMING THE FOCUS OF NEW INDUSTRIAL COMPLEXES. IN THE CASE OF THE CAMPUS, PROXIMITY TO HIGH SPEED HIGHWAYS AND THE EXISTENCE OF AN AIR STRIP MAKES THE AREA ESPECIALLY ATTRACTIVE TO AVIATION ORIENTED INDUSTRIES.

THE BACKGROUND OF CONCEPTS DETERMINING THE DESIGN CRITERIA

- VOCABULARY
  - ZONES/UTILIZATION
  - SCALES/SPACE
  - ENVIRONMENT
    - THERMAL
    - SOUND
    - LIGHTING
    - COLOR
    - COMFORT
  - MOTIVATION
  - RELATIONSHIPS

DESIGN CRITERIA

1. ZONES/UTILIZATION

IN ORDER TO PHYSICALLY MEET THE GOALS STATED IN OUR EDUCATIONAL OBJECTIVES -- TO DESIGN:

A) A PLACE TO ACCOMPLISH DISTINGUISHABLE CHANGE OF ABILITY AND BEHAVIOR OF STUDENTS

B) A PLACE WHICH PRECIPITATES AND READILY ACCOMMODATES CONTINUAL CHANGE IN EDUCATIONAL TECHNOLOGY

WE MUST BEGIN BY ESTABLISHING ZONES FOR SPACE.

IN AN AGE IN WHICH WE ARE PREPARING FOR PROFESSIONS AND OCCUPATIONS THAT DEFY DESCRIPTION, OUR ONLY KNOWN FACTOR IS THAT WE MUST PREPARE INDIVIDUALS TO BE ADAPTABLE TO CHANGE. IN THIS FRAMEWORK OUR UNIVERSITY WILL NOT BE COMPARTMENTALIZED INTO CONVENTIONAL TYPE CLASSROOMS. THE SPACES FOR LEARNING CONSIST OF FLEXIBLE ZONES. THESE SPACE ZONES ARE SO HIGHLY TREATED ACOUSTICALLY THAT IN MOST CASES THEY ARE NOT SEPARATED BY WALLS. WALLS ARE OBSOLETE AS SOUND BARRIERS, AND THEIR ONLY FUNCTION IS TO PROVIDE VISUAL PRIVACY.

THERE ARE ESSENTIALLY TWO CLASSIFICATIONS FOR ZONES OF SPACES: SUBJECT MATTER ZONES AND PEOPLE ZONES.

SUBJECT MATTER ZONES INCLUDE SCIENCE, TECHNOLOGY, GENERAL LEARNING, LIBRARY, SHOPS, ETC. PEOPLE ZONES INCLUDE "STUDENT DORMITORY CELL," STUDENT DISCUSSION LOUNGES, STUDENT DINING, STUDENT DATING ROOMS, FACULTY OFFICES, FACULTY LOUNGES AND RESIDENCES.

SUBJECT MATTER ZONES DEVELOP IN HORIZONTAL, CELLULAR GROWTH, WHEREAS PEOPLE ZONES PREDOMINANTLY GROW IN VERTICAL CLUSTERS PROVIDING PUNCTUATION TO THE UNBOUND HORIZONTAL MULTI-CELL OF WHICH IT IS AN INTEGRAL PART. OUR CAMPUS PROVIDES FOR THE OVERLAPPING OF BOTH ZONES IN ORDER TO FOSTER INTERACTION OF DISCIPLINES.

LEARNING FACILITIES, THROUGH MORE EFFICIENT UTILIZATION OF INSTRUCTOR CAPABILITIES, WILL BE IN USE FOR MORE HOURS DURING A DAY. THESE FACILITIES, THEREFORE, OCCUR OFTEN AND IN BOTH ZONES MENTIONED ABOVE AND THEY ARE EQUIPPED FOR EASY ACCESSIBILITY AND CONTINUOUS USE; IN OTHER WORDS, THEY CONSTITUTE AN OPEN, MAGNETIC FACILITY. ACCESS TO THIS FACILITY IS ACHIEVED THROUGH THE NEW TECHNOLOGICAL KNOW-HOW FOR STORAGE AND RAPID RETRIEVAL OF INFORMATION. SUCH ACCESSIBILITY BECOMES A NATURAL IN OUR CRITERIA FOR A CONTINUALLY EXPANDING MULTI-CELL.

CAMPUS ZONES MUST DO DOUBLE OR TRIPLE DUTIES. THEREFORE, SPACE FOR INDIVIDUAL STUDY IS PROVIDED IN THE LIBRARY, THE RESIDENCES AND THE INSTRUCTIONAL BUILDINGS. FLEXIBLE SPACES MEAN THAT THEY CAN BE READILY ADAPTED TO USE BY LARGE GROUPS OR SMALL DEPENDING ON INSTRUCTIONAL NEEDS. CLOSELY BOUND UP WITH THE NEED FOR A FLEXIBLE CAMPUS IS THE NEED FOR FULL UTILIZATION OF CAMPUS SPACE, TIME, PEOPLE AND EQUIPMENT. BECAUSE OUR CAMPUS MUST MAKE GREAT USE OF TIME, PHYSICAL ACCESS AS WELL AS MATERIAL ACCESS IS OUR GOVERNING DESIGN CRITERIA.

2. SCALE/SPACE

SCALE IS ONE OF THE MOST IMPORTANT ATTRIBUTES OF SPACE.

WHEN SETTING OUT TO DESIGN A MAJOR SPACE ONE MAKES SURE EVERYTHING ABOUT ITS STRUCTURE SUBORDINATES ITSELF TO SPACE, THAT ONE, POSITIVE, MOST COMPELLING IDEA OF THE "WHOLE STRUCTURE." THE SCALE OF THE SINGLE HUMAN IS EXPRESSED IN A SMALL MODULE, FOUR TO FIVE FEET, SUCH AS FOUND IN A REGULAR CLASSROOM. BUT MANY OF THESE MODULES ARE IN A WAY INHUMAN BECAUSE THEY HAVE NO LARGER MODULE, NO GROUP OR CROWD MODULE THAT WOULD EXPRESS FORMLESS CROWDS OF INDIVIDUALS. THE CROWD IS VERY MUCH A REALITY IN TODAY'S REQUIREMENTS IN THE EDUCATIONAL WORLD AND IT DOESN'T FIT INTO ONE RECTANGULAR BOX. THE FLOW OF PEOPLE DETERMINES THE SHAPE OF SPACE.

ARCHITECT LE CORBUSIER SAID WITH POETRY THAT "SPACE IS THE FOOT THAT WALKS, THE EYE THAT SEES, THE HEAD THAT TURNS."

PSYCHIATRIST HUMPHREY OSMOND DISTINGUISHES BETWEEN TWO KINDS OF SPACES ACCORDING TO THEIR EFFECT AND BEHAVIOR. ONE KIND HE CALLS SOCIOPETAL AS THAT SPACE WHICH BRINGS PEOPLE TOGETHER. THE OTHER KIND HE LABELS SOCIOFUGAL AS THAT WHICH KEEPS PEOPLE APART. BOTH ARE NECESSARY.

BECAUSE OUR PROGRAM IS HIGHLY CONCERNED WITH MAINTAINING THE INTEGRITY OF THE INDIVIDUAL AND FOSTERING MEANINGFUL GROUP BEHAVIOR AT THE SAME TIME, WE ARE HIGHLY CONCERNED, ALSO WITH GUARANTEEING THAT THE HUMAN SCALE AND THE ARCHITECTURAL SCALE ARE COMPLEMENTARY.

3. ENVIRONMENT

A NUMBER OF FACTORS MUST BE CONSIDERED IN THE CREATION OF A MAN-MADE ENVIRONMENT WHICH IS TO PROVIDE FOR AND CONTRIBUTE TO OPTIMAL LEARNING CONDITIONS. A DISREGARD FOR ANY ONE OF THESE FACTORS CAN RESULT IN A BREAKDOWN OF THE TEACHING PROCESS OR IN AN ACTUAL IMPAIRMENT OF THE HUMAN ORGANS WHICH MUST RESPOND TO THE CONDITION. MANY RESEARCH STUDIES HAVE SHOWN BOTH THE RESULTS OF PROLONGED ENVIRONMENTAL STRESS AND THE IMPROVED PRODUCTION OF PEOPLE WORKING IN CAREFULLY PLANNED, ADEQUATE ENVIRONMENTAL CONTROL.

A. THERMAL - WE KNOW THAT THERE ARE OPTIMAL TEMPERATURES AND HUMIDITY LEVELS BEYOND WHICH THE HUMAN BEING MAKES MUSCULAR COMPENSATIONS WHICH DETRACT FROM CONCENTRATION AND PRODUCE FATIGUE.

ONE OF OUR ARCHITECTURAL CONCERNS IS TO PROVIDE THE CONTROL OF TEMPERATURE AND HUMIDITY AT OPTIMUM LEVELS.

B. ACOUSTICAL - SOUND, PRODUCED AT HIGH LEVELS OVER LONG PERIODS OF TIME PRODUCES FATIGUE AND IRRITABILITY AND UNDER EXTREME CONDITIONS MAY INJURE THE EAR ITSELF. SOUND PROBLEMS OF THIS SORT PRESENT THEMSELVES IN THE MACHINE AREAS OF THE COMPLEX AND ARE OF CONSIDERABLE ARCHITECTURAL CONCERN.

SOUND CONTROL - THE MUFFLING OR ABSORBING OF SOUND, OR THE REVERSE, PROJECTION OF SOUND, CONSTITUTES THE PROBLEM OF ACOUSTICS, A VERY COMPLEX PROBLEM IN THE DEVELOPMENT OF MODERN EDUCATIONAL PLANTS.

ONE OF THE BEST ACOUSTICAL SOLUTIONS TO INSTRUCTIONAL SOUND PROBLEMS HAS BEEN IN THE USE OF CARPETING. USE OF THIS MEDIUM ALLOWS US TO CREATE LARGE, CONTINUOUS LOFT SPACES WITHOUT THE NEED FOR WALLS. CARPETING ELIMINATES THE SOUND OF MOVING FURNITURE AND FEET -- A HIGH PERCENTAGE OF THE TOTAL SOUND LEVEL IN THE AVERAGE CLASSROOM. THE CARPETING ALSO ABSORBS THE HUMAN VOICE SO THAT IT BECOMES BACKGROUND NOISE BEYOND ABOUT 19 FEET.

CARPETING WILL NOT CONTROL AMPLIFIED SOUND, AND IT IS THEREFORE NECESSARY TO PROVIDE SPACES WHICH WILL PROJECT AND CONTROL AMPLIFIED SOUND. ALSO, BECAUSE OF THE HIGH LEVEL OF SOUND GENERATED BY METAL AND OTHER OBJECTS IN CERTAIN ACTIVITIES, WE REQUIRE THAT CERTAIN AREAS BE ACOUSTICALLY ISOLATED FROM OTHERS.

C. LIGHTING - IN TODAY'S LEARNING SPACES MORE AND MORE LIGHT IS NECESSARY AND BETTER CONTROL OF LIGHTING BECOMES AN URGENT NECESSITY. USED PROPERLY LIGHT MAY ALSO BECOME THE NIGHTTIME ORGANIZING DEVICE. MAJOR ROADWAYS AND PARKING ARE DEFINED WITH MERCURY VAPOR AT DIFFERENT LEVELS OF ILLUMINATION. PEDESTRIAN WAYS ARE DONE ENTIRELY WITH INCANDESCENT LIGHT. LIGHTING IS MORE SUBTLE AT THE EXTREMES, BECOMING MORE INTENSE AS ONE APPROACHES THE MAIN PORT OF ARRIVAL.

INTERNALLY WE ARE CONCERNED WITH THE FLUORESCENT AND POLARIZED LIGHTING TO SATISFY THE BRIGHTNESS, INTENSITY AND DIRECTIONAL CHARACTERISTICS REQUIRED BY SPECIFIC KINDS OF LEARNING TASKS. OUR PROGRAM DEFINES A NUMBER OF SUCH DIFFERENT TASKS.

COINCIDENT WITH THE PROBLEM OF PROPER LIGHTING IS THE PROBLEM POSED BY NATURAL LIGHT, WHICH DESTROYS POLARITY, CREATES GLARE AND PRODUCES CONTRASTS WHICH RESULT IN EYE DISTRACTION AND FATIGUE.

THIS PROBLEM AND THE NEED TO SHUT OUT THE NOISE OF NEARBY AIRPLANES AT FIRST PROMPTED US TO CONSIDER A WINDOWLESS COMPLEX; BUT FURTHER CONSIDERATION OF THE DESIRABILITY OF HAVING STUDENTS SEE AND IDENTIFY WITH THE PLANES, PROMPTED US TO CONSIDER DOUBLE-GLASS EXTERNAL WALLS TO AFFORD THE VIEW AND THE SOUND BARRIER. THE INTERNAL WALLS THEN ARE SOLID TO SHUT OUT THE UNWANTED GLARE OF NATURAL LIGHT.

D. COLOR - AMERICAN BUSINESS HAS DISCOVERED THAT COLOR HAS AN AMAZINGLY POWERFUL EFFECT ON HUMAN EMOTIONS, AND IS WILLING TO BACK THAT DISCOVERY WITH MONEY. THE AMERICAN EDUCATION SYSTEM CANNOT AFFORD TO IGNORE THIS DISCOVERY, ESPECIALLY WHEN THE COST OF COLOR IS LESS THAN ONE PERCENT OF A SCHOOL CONSTRUCTION BUDGET, AND IT IS JUST AS EASY TO SPECIFY THE RIGHT COLOR.

E. COMFORT - THE BEST CONDITIONS THAT CAN EXIST FOR PHYSICAL COMFORT IN CLASSROOMS ARE NO CONDITIONS; MEANING, THERE SHOULD BE NO RECOGNIZED DIFFERENCE BETWEEN WHAT A PERSON CONSIDERS COMFORT AND THE ACTUAL ATMOSPHERIC CONDITION WITHIN THE ROOM ITSELF. THERE SHOULD BE NO NOTICEABLE HOT SPOTS, DRAFTS, COMPLAINTS OR STUFFINESS, NO ABNORMAL NOISES, AND IN GENERAL THE CONDITION OF THE ROOM SHOULD BE UNNOTICED.

THE BEST PROFESSOR CANNOT TEACH AND THE BRIGHTEST STUDENT CANNOT LEARN TO FULL CAPACITY IN A ROOM WHERE THE CLASSROOM, THE LEARNING SPACE, THE POD, THE CARREL OR THE LIVING SPACE, IS TOO DARK, TOO NOISY, TO WARM OR TOO COLD. THE CORRIDOR WALLS CAN IRRITATE, ELATE OR DEPRESS. THE GENERAL AMENITY OF THE ENVIRONMENT, EXTERIOR AS WELL AS INTERIOR, CAN INFLUENCE AND MOLD THE JUDGMENT OF A STUDENT.

4. MOTIVATION

IT MAY BE ARGUED THAT MOST PEOPLE WHO BECOME INVOLVED IN TECHNICAL-TYPE PROGRAMS ARE HIGHLY MOTIVATED, AND WHEREAS THIS MAY BE TRUE, IT IS STILL A KNOWN FACT THAT THE LEARNING PROCESS REQUIRES CONSTANT MOTIVATION AND REMOTIVATION.

WE FEEL THAT OUR CONCERN FOR THE SPACE AND ENVIRONMENTAL CHARACTERISTICS JUST DISCUSSED WILL SERVE TO SUSTAIN AND INCREASE MOTIVATION.

WE FEEL THAT THE VARIETY OF PRESENTATION POSSIBLE THROUGH ELECTRONIC MEANS WILL SERVE AS A STIMULUS TO MOTIVATION AND THAT OUR ENGINEERING OF MAXIMUM ACCESS TO THESE MEDIA CONTRIBUTES DIRECTLY TO MOTIVATION.

WE BELIEVE THAT THE IMMEDIATE ACCESS TO INFORMATION AT MANY PLACES, INCLUDING AND OVER AND ABOVE THE LIBRARY, ALSO CONTRIBUTES TO MOTIVATION.

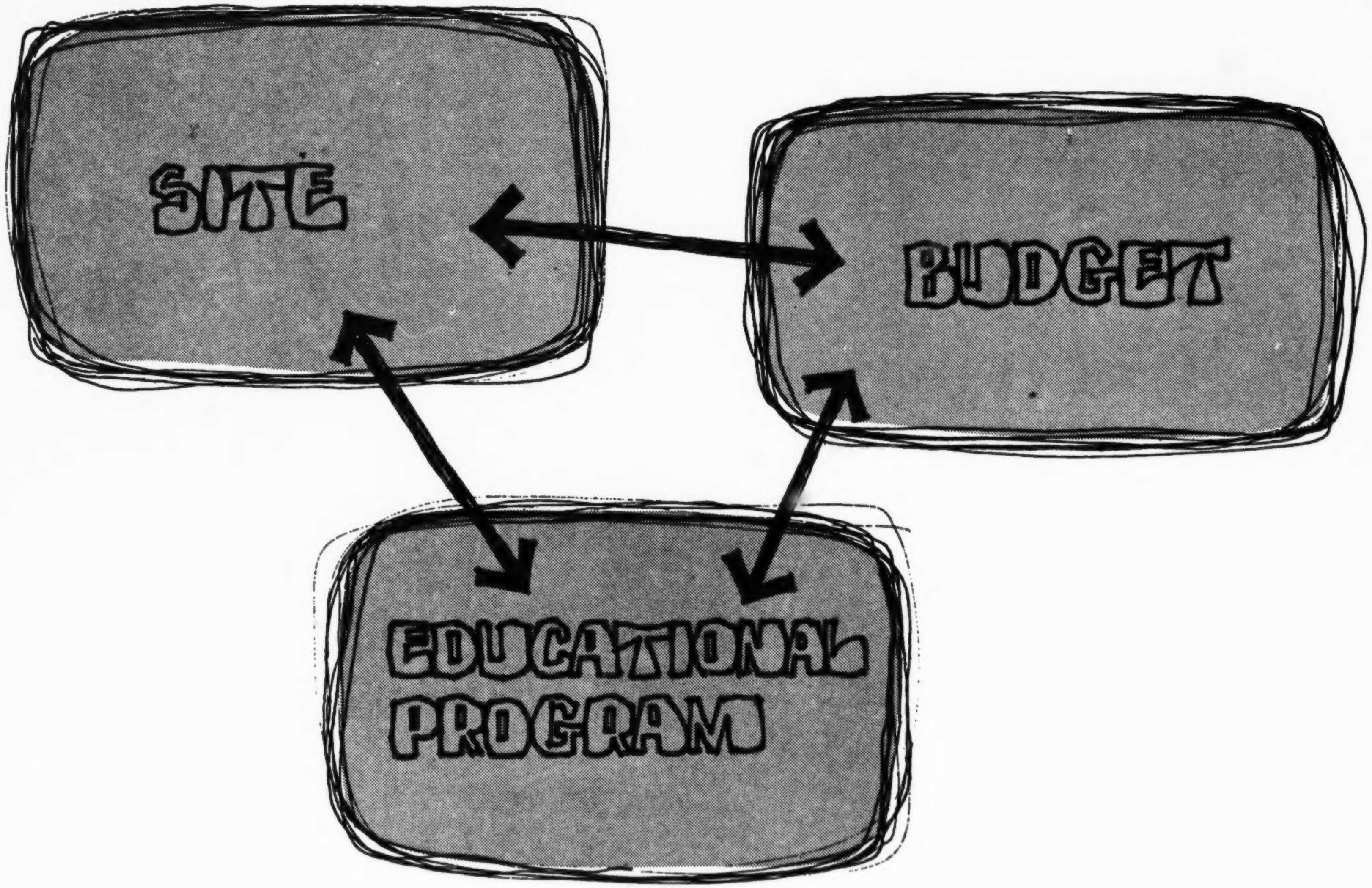
CLOSE, VISUAL CONTACT WITH THE REAL THING - LIVE AVIATION IS THE ULTIMATE IN IDENTIFICATION AND MOTIVATION.

5. RELATIONSHIPS

THE ARCHITECTURAL ANSWER TO SPACE FOR THIS APPROACH TO LEARNING IS IN THE FORM OF FLEXIBLE, COLUMN-FREE AREAS WHICH WILL ACCOMMODATE THE FUTURE OF AN EVOLVING PROGRAM. THE BASIC CLASSROOM UNIT, CALLED THE POD CONSISTS OF LEARNING AREAS SHARING A CENTRAL PREPARATION CORE: THE RETRIEVAL CENTER. TO MEET THE NEED FOR INTERACTION, THIS POD IS DEFINED BY SURROUNDING FACULTY OFFICES AND OTHER AREAS. THE CLASSROOM AND LABORATORY UNITS ARE GROUPED IN A MULTI-CELLULAR FASHION HELD TOGETHER BY THE COMMUNICATION DISTRIBUTION CENTERS AND BY A MAJOR CO-ORDINATING AREA: THE INSTRUCTIONAL MATERIAL CENTER, WHICH HOUSES THE COMPUTER CENTER AND THE AUDIO VISUAL CENTER AND LIBRARY.

THIS "HUB" ACCOMMODATES AND ENDORSES THE CONCEPT OF COMPUTER ASSISTED, MULTI-MEDIA LEARNING, CAMML.

E. THE ELEMENTS OF DESIGN


SITE
BUDGET
EDUCATIONAL PROGRAM

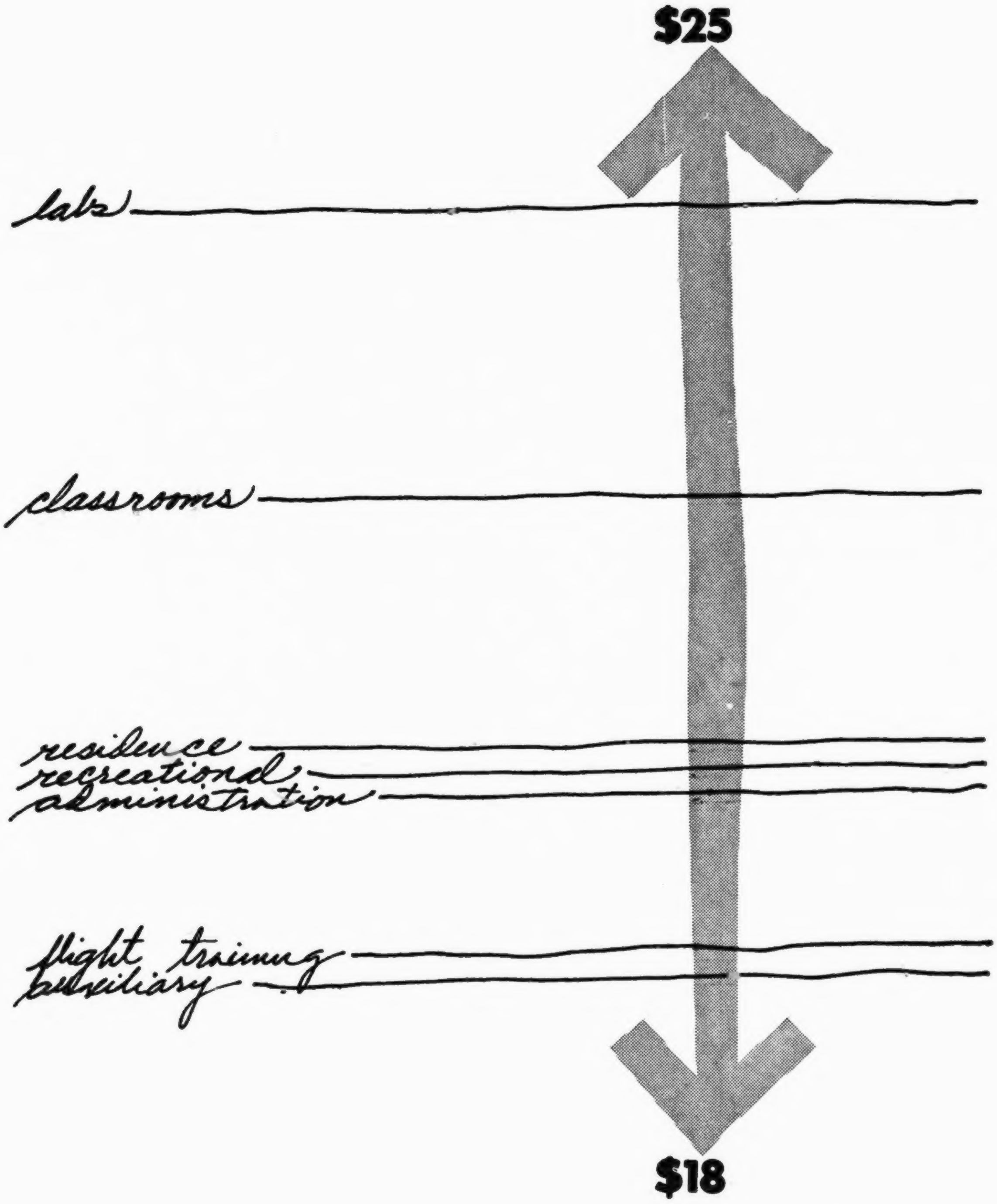
a **GOOD DESIGN** makes use of the advantages and restraints imposed by **SITE** and **BUDGET**, in order to meet the requirements originated by the **EDUCATIONAL PROGRAM**.

PHASING

	Phase	Potential Students F.T.E.	Area S.F.	
FLIGHT TRAINING	I	500	36,550	Sept. 1 - 1969
ACADEMIC	II	1,000	186,035	Sept. 1 - 1970
ACADEMIC	III	2,000	267,340	Sept. 1 - 1971

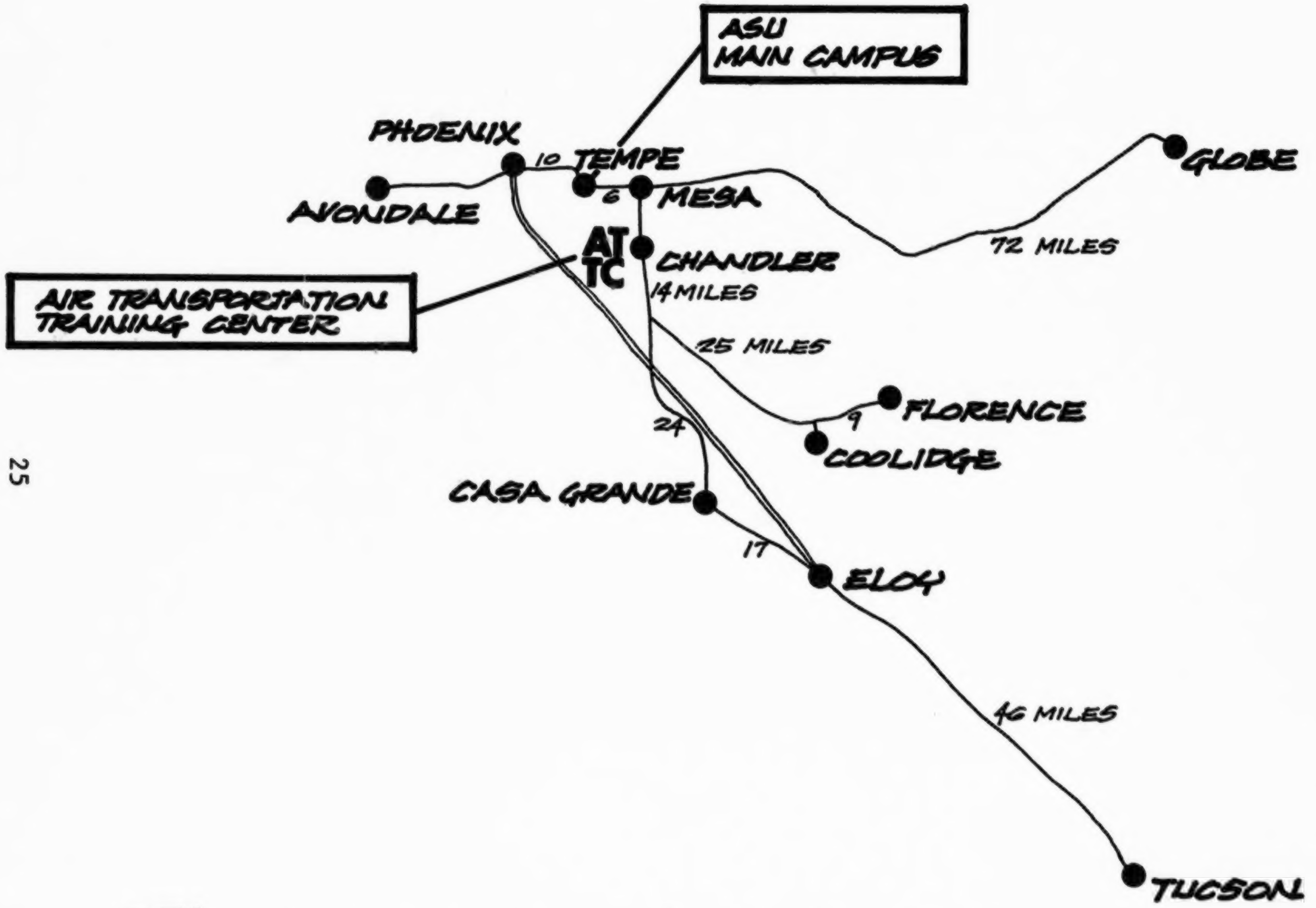
Proper **PHASING** will make possible the **EARLY USE** of the Flight Training center and the **ORDERLY GROWTH** of the campus, to its ultimate size.

COST


$25
labs
classrooms
residence
recreational
administration
flight training
auxiliary
$18

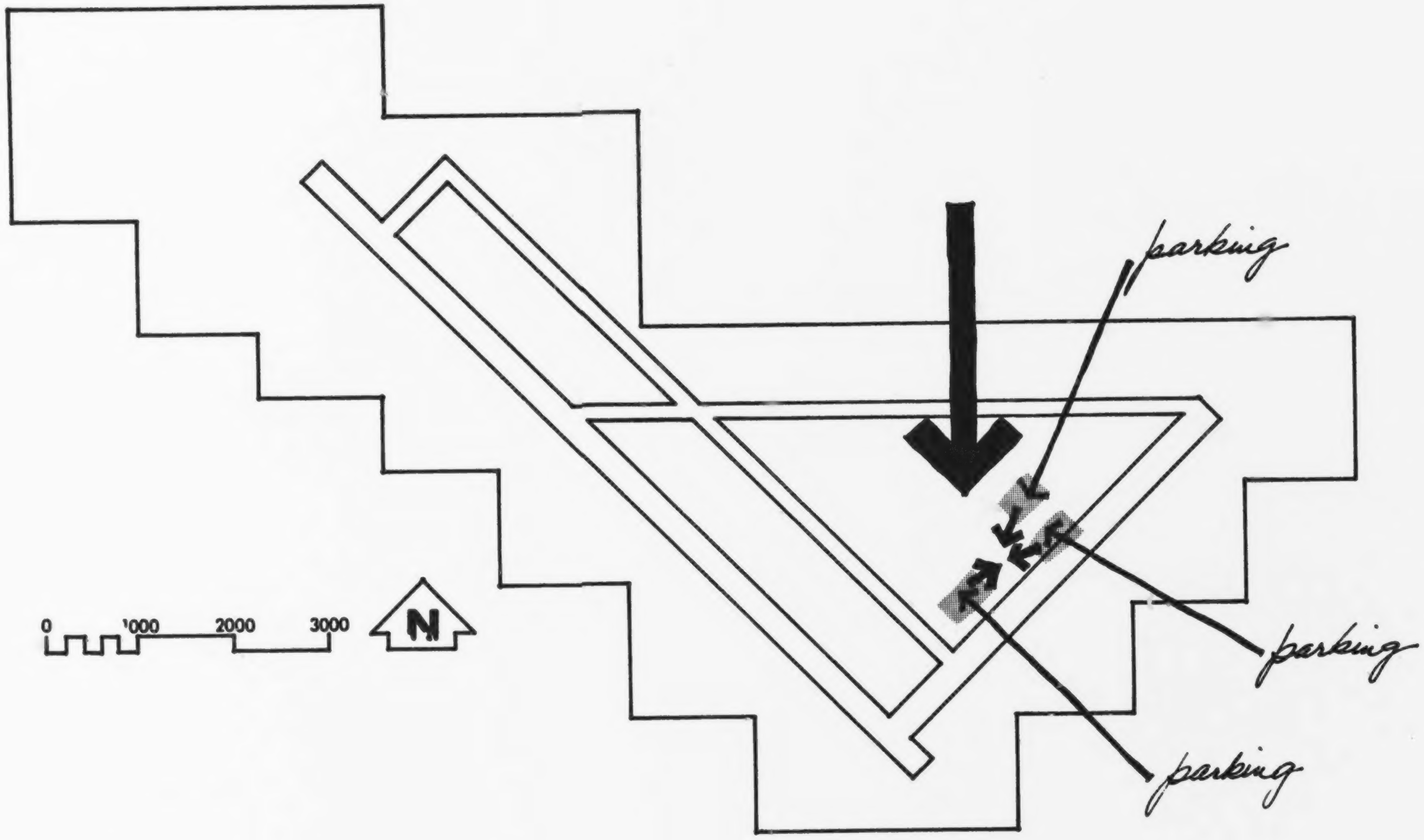
Highly sophisticated learning systems of today mean **HIGHER** construction costs. This campus **MINIMIZES** the problem, by an adequate room utilization factor and by the relative **CLOSENESS** of all elements.

TIME / DISTANCE


ASU
MAIN CAMPUS
PHOENIX
10
TEMPE
6
MESA
AVONDALE
GLOBE
72 MILES
AT
TC
CHANDLER
14 MILES
AIR TRANSPORTATION
TRAINING CENTER
25 MILES
9
FLORENCE
COOLIDGE
24
CASA GRANDE
17
ELOY
46 MILES
TUCSON

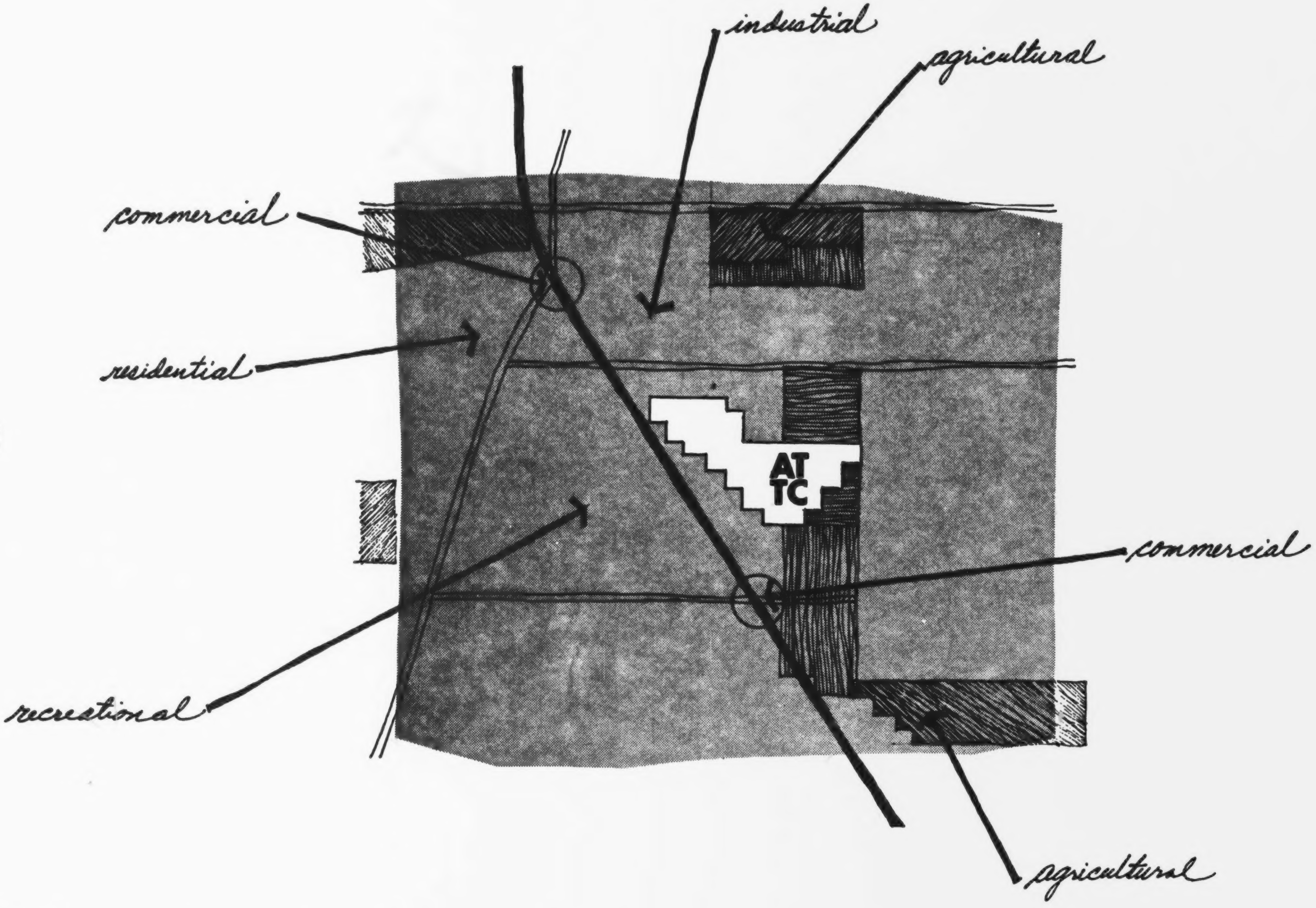
The **INTEGRATION** of the flight training portion of the program with the academic center and housing, eliminates time and transportation as a factor in class schedules, and yet the **PROXIMITY** to the parent campus (12 min.) makes it available for **SHARING** of major facilities.

ENTRANCE / PARKING


parking
parking
parking
0
1000
2000
3000
N

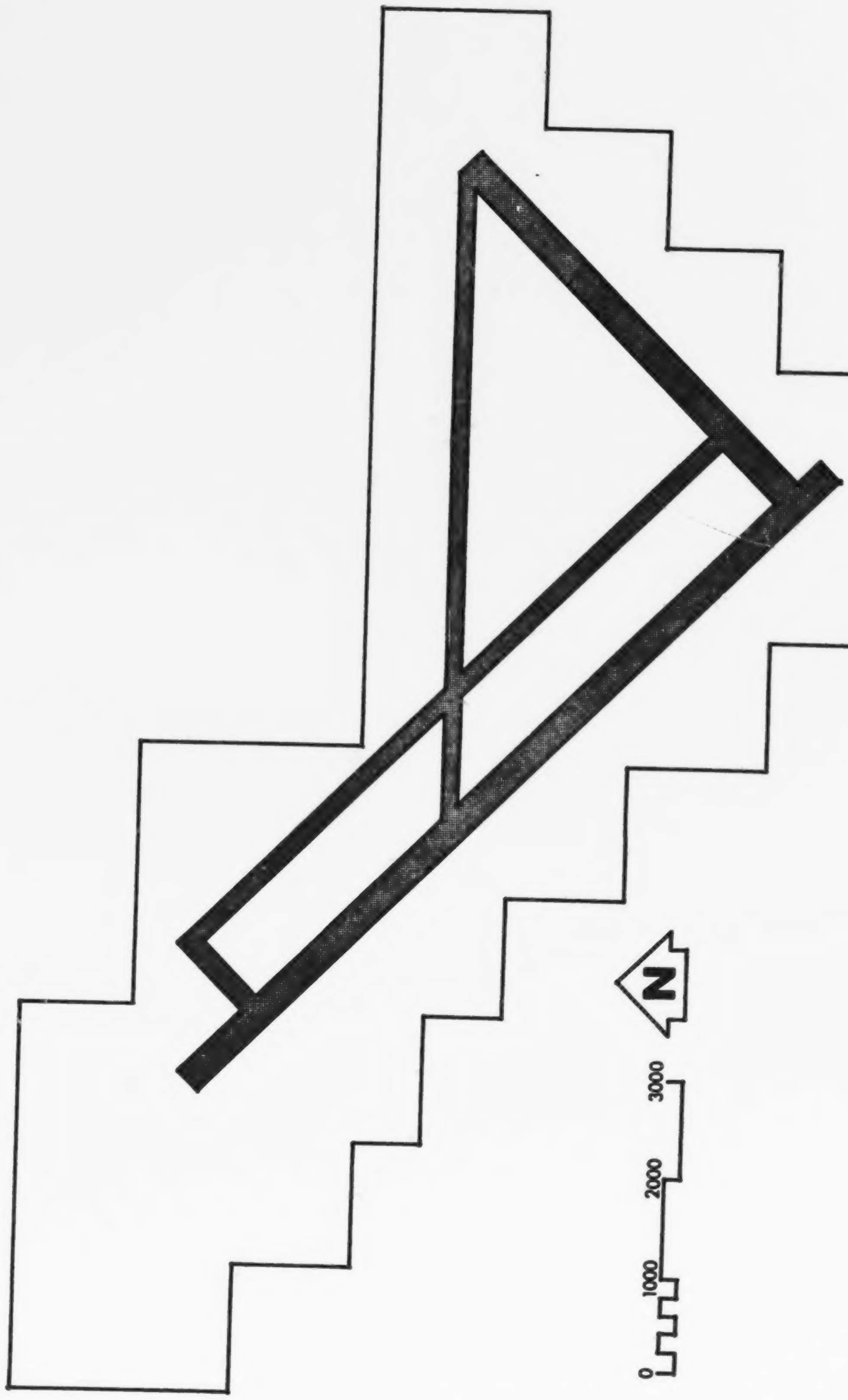
A careful planned entrance makes the campus **ACCESSIBLE** to the surrounding communities. Properly located parking eliminates dangerous pedestrian-vehicular intersections.

ZONING


industrial
agricultural
commercial
residential
AT
TC
commercial
recreational
agricultural

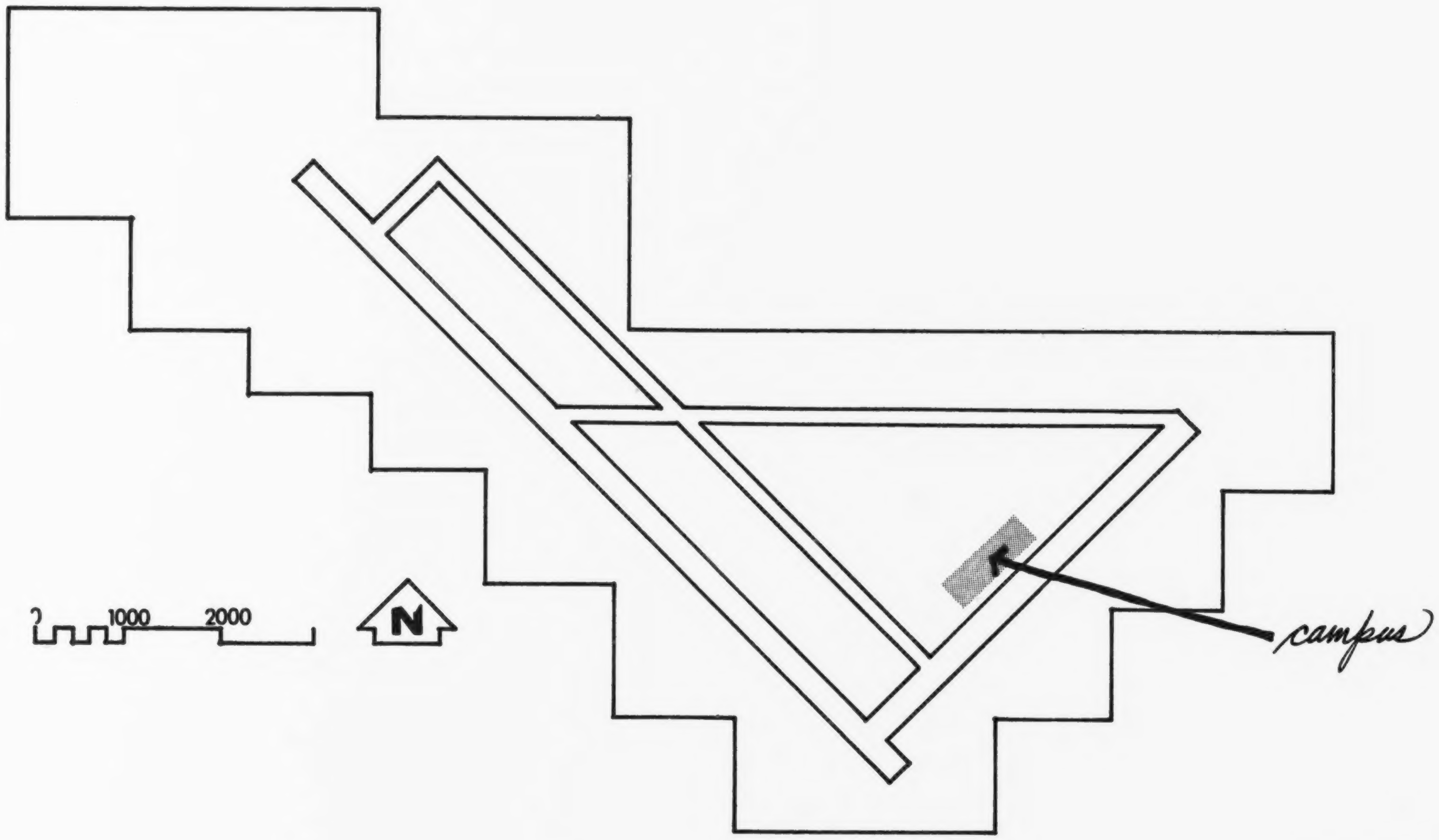
The insertion of a new educational/residential complex into existing land plan goes beyond the establishing of another land use to become **THE FOCAL POINT** which will give impulse to the development of the entire area.

EXISTING STRUCTURES


0
1000
2000
3000
N

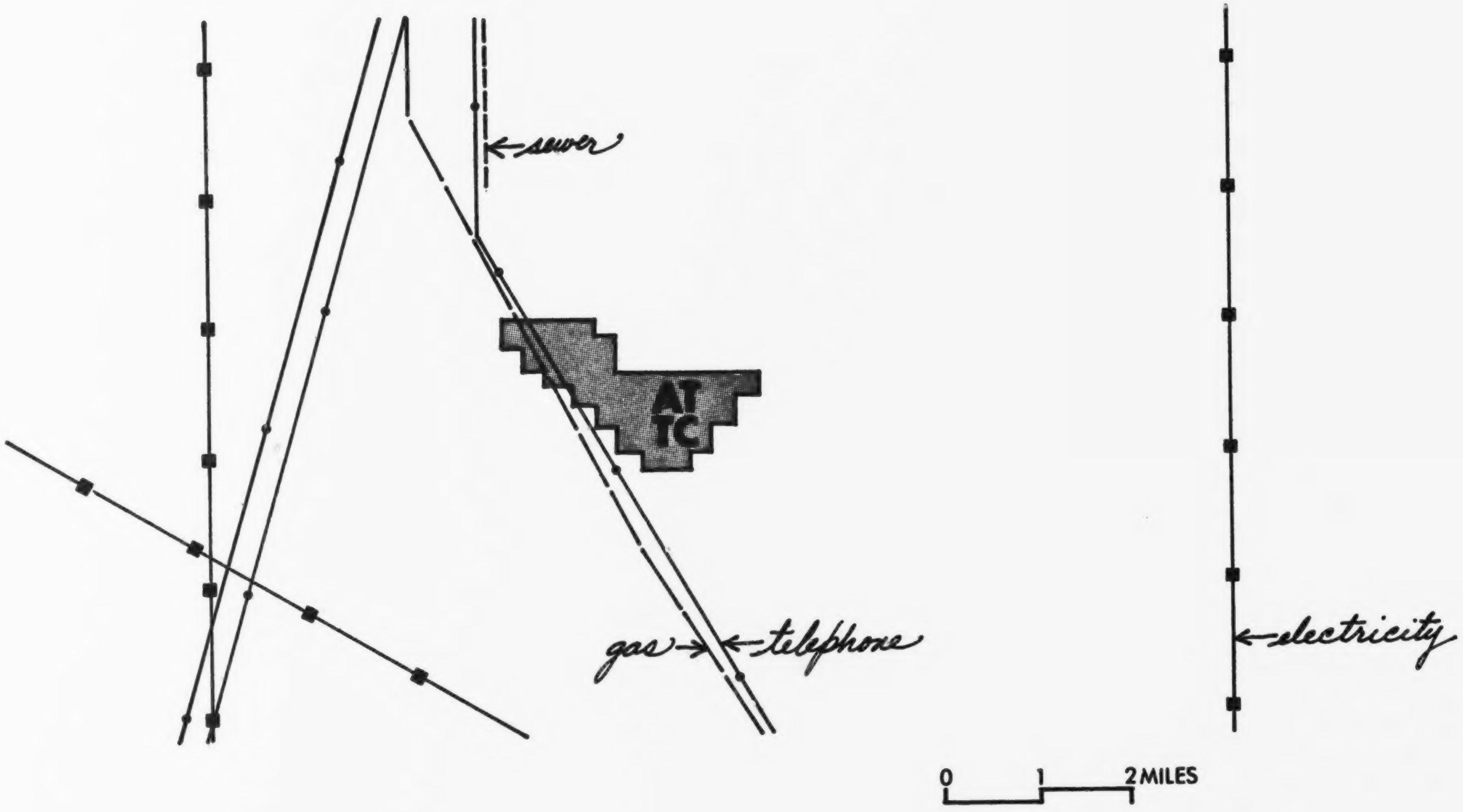
The existence of a **RUNWAY** and taxiways constitutes an important **ASSET** to the selected site.

LOCATION


campus
N
0
1000
2000

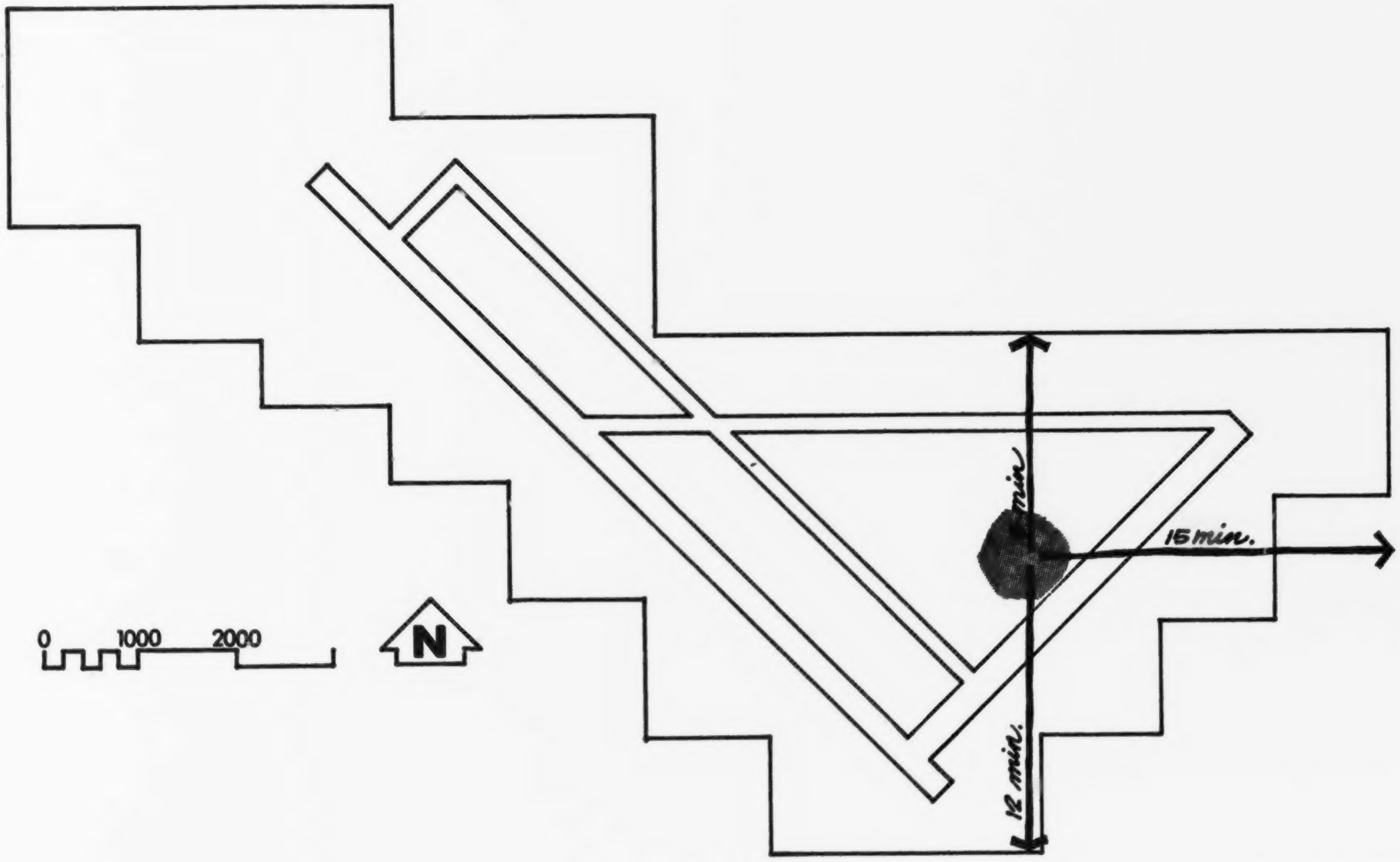
The proximity of the facilities to an existing paved surface provides convenient outdoor **WORKING AREA** for the labs.

UTILITIES


sewer
AT
TC
gas
telephone
electricity
0
1
2 MILES

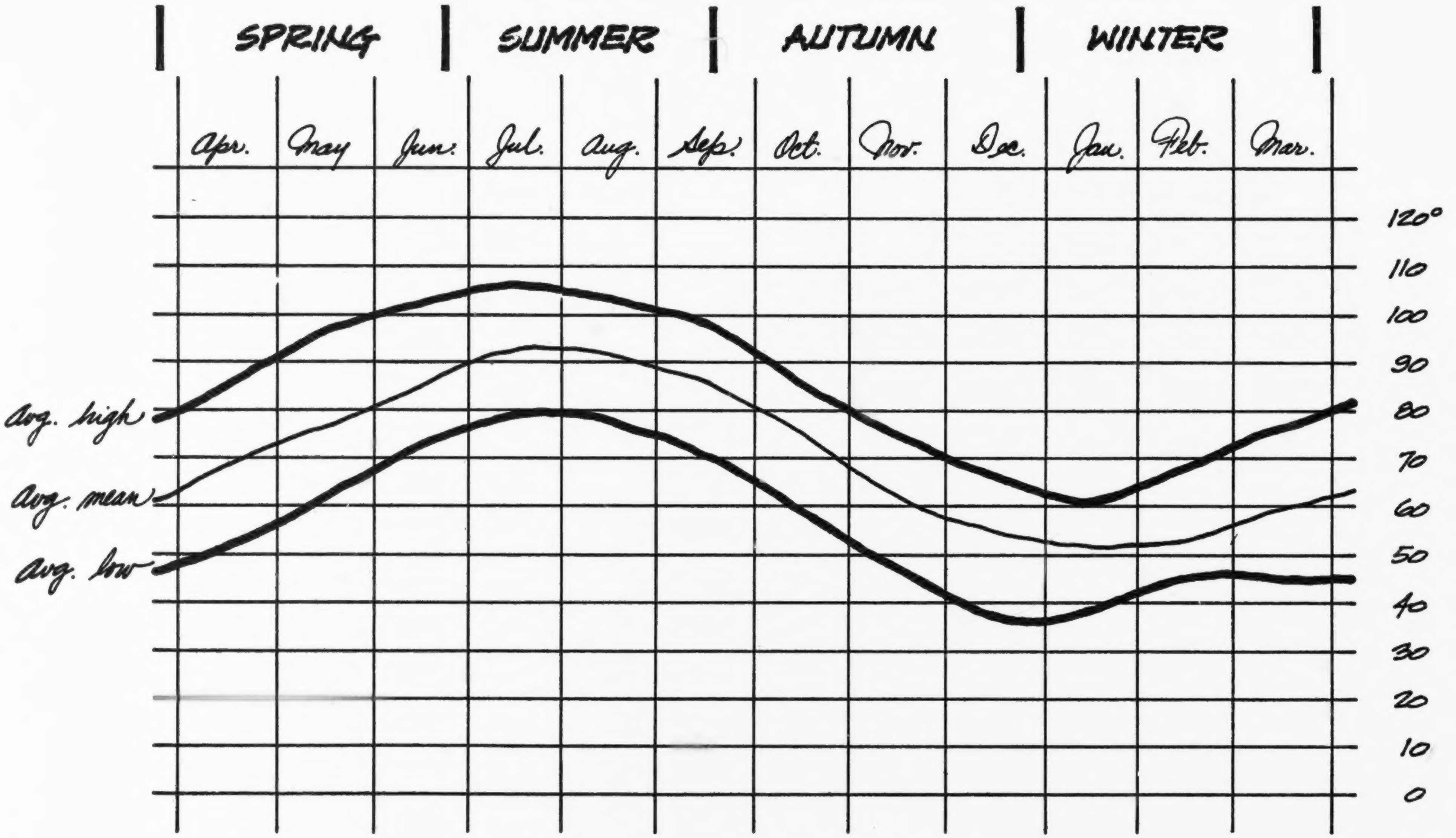
The **INTEGRATION** of the flight training and the academic center reduces the **COST** of bringing the **UTILITIES** to the structures on the campus.

WALKING DISTANCE


min.
15 min.
12 min.
0
1000
2000
N

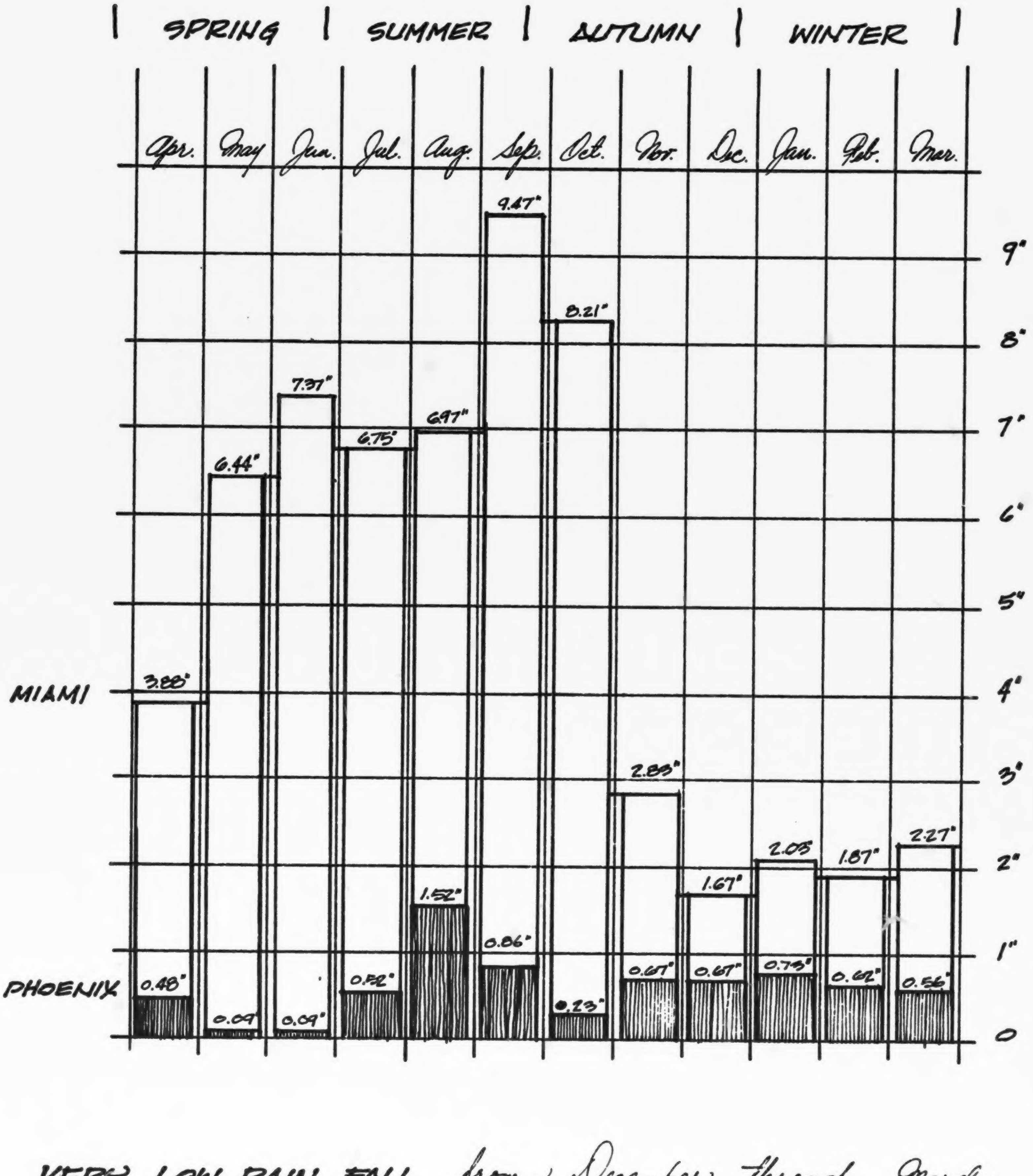
The compactness of this **UNIQUE** solution makes every corner of the **CAMPUS** easily **REACHED** within a reasonable **WALKING DISTANCE**

CLIMATE



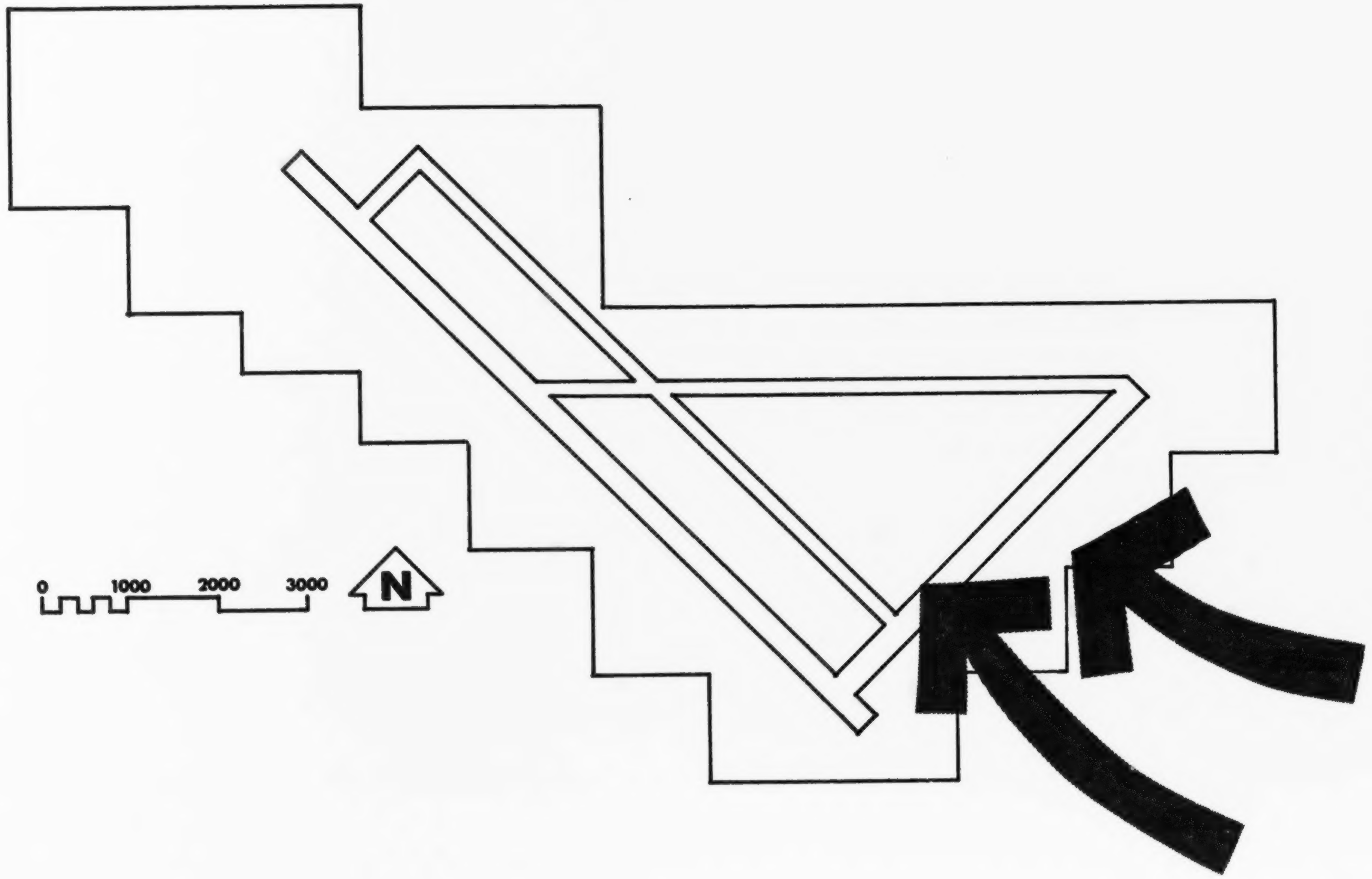
SUMMERS are warm and dry. **WINTERS** are mild. The building embraces the open spaces to **PROTECT** them from the **ELEMENTS**. Ample provision of **ROOFED** exterior areas offer **RELIEF** to pedestrians.

PRECIPITATION



VERY LOW RAIN FALL from December through March.
August is the RAINY month.

PREVAILING WINDS

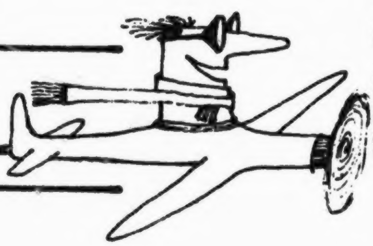


WINDS from S.E. and E.S.E. passing through the **BREEZEWAYS** cool the complex on its entire length and take the **NOISE** of the engines **AWAY** from the dormitories **THE QUIET ZONE.**

FLYING WEATHER

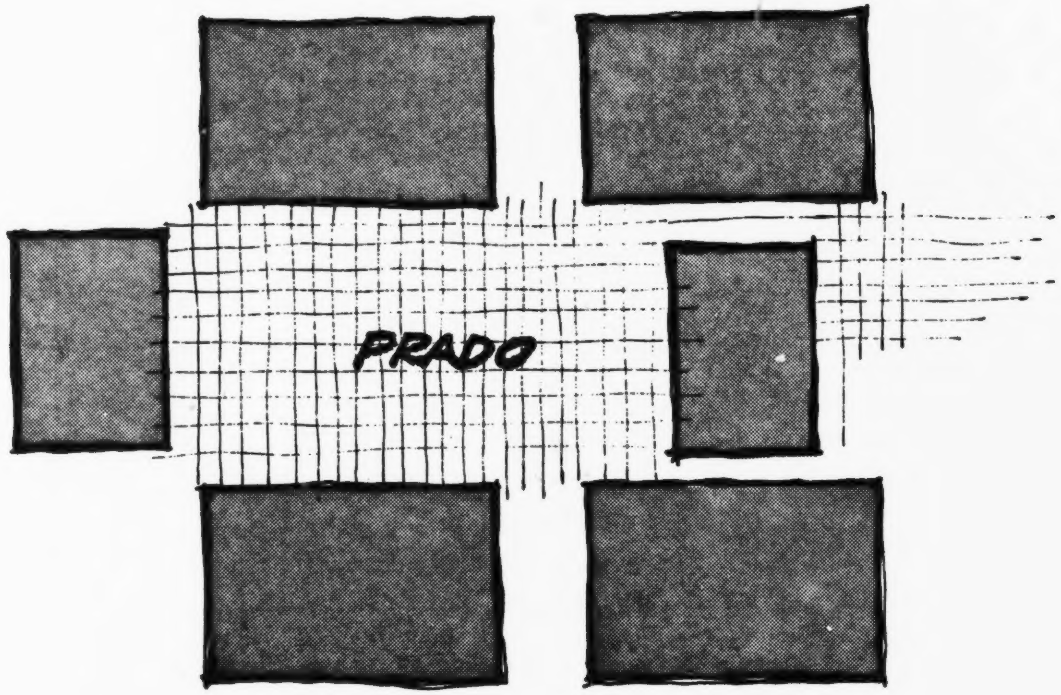
FREQUENCY OF OCCURRENCE
CONTACT CEILING ≥ 1000 FT. WITH VISIBILITY ≥ 3 MILES

City	Dec. to Feb.	Mar. to May	June to Aug.	Sept to Nov.	Average
CHICAGO	43	48	55	51	49.25
WASHINGTON	61	82	77	65	71.25
MIAMI	95	93	97	96	95.25
PHOENIX	99.6	99.8	99.6	99.7	99.7



The "PERFECT" visibility makes the area appropriate for the developing of this program 99.7% of the time - flying weather is IDEAL.

THE PRADO



Creation of a pleasant **INDOOR** atmosphere looking toward a succession of man made landscaped **INTERIOR** plazas "**THE PRADO**", where the **OPEN** spaces **RAMBLE** inside the complex before escaping to the desert.

F. RESEARCH SUMMARIES

CARPET RESEARCH SUMMARY *

THE FOREMOST QUALITY OF CARPET WHICH MAKES IT HIGHLY DESIRABLE FOR USE IN EDUCATIONAL FACILITIES IN CREATING AN ATMOSPHERE FOR THE LEARNING PROCESS, IS THE SOUND ABSORPTION VALUE. OFTEN THE CARPET CONTRIBUTES AS MUCH AS TEN TIMES THE AMOUNT OF SOUND ABSORPTION AS OTHER MATERIALS. REVERBERATION CHAMBER TESTS OF FOUR SAMPLES OVER 40 OZ. HAIR UNDERLAY SHOW AN AVERAGE NOISE REDUCTION COEFFICIENT OF .55. IN ACOUSTICS, ANY MATERIAL THAT HAS A NOISE REDUCTION COEFFICIENT OF ABOUT .50 (OR MORE) IS CONSIDERED A SIGNIFICANT NOISE ABSORBENT. HIGHEST NOISE REDUCTION COEFFICIENT OF SMOOTH FLOOR FINISHES, INCLUDING CORK, IS AN AVERAGE OF .05 OVER THE AUDIBLE FREQUENCY RANGE.

FURTHER, THE EFFICIENCY OF CARPET FOR SOUND ABSORPTION REMAINS MORE CONSTANT BECAUSE IT IS REGULARLY MAINTAINED BY CLEANING, WHEREAS CEILING ACOUSTIC TREATMENTS LOSE EFFICIENCY WITH THE ACCUMULATION OF DUST IN THE OPENINGS WHICH TRAP THE ENERGY OF SOUND WAVES. MOST CEILINGS HAVE THEIR SOUND ABSORPTION QUALITIES VIRTUALLY DESTROYED BY PAINTING TO RESTORE THEIR APPEARANCE.

THE SUBSTITUTION OF FLOOR SOUND ABSORPTION MATERIAL FOR CEILING TREATMENT MAKES IT POSSIBLE TO USE SOUND REFLECTIVE CEILINGS. THESE CEILINGS WILL REFLECT THE TEACHERS' VOICE OVER THE HEADS OF THOSE NEAREST THE FRONT, TO THE REAR OF THE ROOM. ALSO IT ENABLES THE REMAINDER OF THE CLASS TO HEAR THE STUDENT RECITATION. MEANWHILE THE CARPET DEADENS AND ABSORBS THE DISTRACTING SOUNDS OF SHUFFLING FEET, SCRAPING CHAIRS, AND FALLING PENCILS OR BOOKS. IT LOWERS THE SOUND LEVEL OF THE IMMEDIATE ENVIRONMENT, BUT WILL NOT TAKE THE PLACE OF ADEQUATE PARTITIONS AND EXTERIOR WALLS TO PREVENT THE TRANSMISSION OF DISTRACTING EXTERNAL SOUND SOURCES.

OTHER ASPECTS OF CARPET'S TOTAL DELIVERY ARE WARMTH, SAFETY AND COMFORT. THE PILE CONSTRUCTION AND PADDING ARE HIGHLY EFFICIENT THERMAL INSULATION. DEMONSTRATIONS HAVE SHOWN THAT OVER A COLD CEMENT SLAB CARPET'S SURFACE TEMPERATURE IS SUBSTANTIALLY HIGHER THAN THAT OF TILE. THEREFORE, CARPET RELIEVES COLDNESS TO FOOT CONTACT AND AT ANKLE LEVEL AND ABOVE. SUCH COLDNESS IS UNPLEASANT, AND COSTLY TO CORRECT IN ANY OTHER WAY SO THAT IT GENERALLY GOES UNCORRECTED.

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* SCHOOL CONSTRUCTION RESEARCH REPORT NO. 9 FOR DADE COUNTY BOARD OF PUBLIC INSTRUCTION BY PANCOAST/FERENDINO/GRAFTON ARCHITECTS.

CARPET CONTRIBUTES TO SAFETY BY REDUCING THE INCIDENCE OF SLIPS AND SLIDES IN WHAT MIGHT OTHERWISE BE HIGH ACCIDENT AREAS. IT PROTECTS PEOPLE IN A HURRY AND CUSHIONS FALLS WHEN THEY DO OCCUR TO PREVENT SERIOUS INJURY.

SINCE ONE OF THE PRIME REASONS FOR THE SELECTION OF CARPET IS THE SOUND ABSORPTION VALUE, WE SHOULD BE GOVERNED BY THE AVAILABLE TEST DATA REGARDING THE EFFECTS OF VARIATIONS IN CARPET DESIGN.

FIRST, DENSITY OF PILE IS A FACTOR DETERMINING SOUND ABSORBENCY. IN GENERAL, THE MORE DENSE THE PILE THE GREATER THE ABSORPTION VALUE, PARTICULARLY AT HIGH FREQUENCIES. ALSO IF ONE CARPET HAS TWICE THE DENSITY OF ANOTHER THEN THE DENSER FABRIC SHOULD HAVE APPROXIMATELY FOUR TIMES THE DURABILITY. FOR THESE REASONS WE RECOMMEND A MINIMUM FACE WEIGHT OF 49.5 OZ. PER SQUARE YARD USING 100% WOOL AS A BASIS. A MINIMUM OF THREE-PLY YARN WITH A MINIMUM OF 64 TUFTS PER SQUARE INCH OR 216 PITCH (PER 27 INCH WIDTH) WITH 8-1/4 WIRES PER INCH IS RECOMMENDED.

SECOND, DEPTH OF PILE ALSO MAKES SUBSTAINTIAL DIFFERENCE IN ABSORPTION EFFICIENCY. PROVIDED THE FABRIC IS DENSE ENOUGH THAT THE FIBERS SUPPORT ONE ANOTHER, AND THE SAME FIBER USED, DURABILITY IS DIRECTLY PROPORTIONAL TO PILE DEPTH. ANOTHER ADVANTAGE OF DEEP PILE IS BETTER HIDING OF SOIL UNTIL IT CAN BE VACUUMED. WE RECOMMEND A MINIMUM AVERAGE PILE DEPTH OF .255 FOR EDUCATIONAL FACILITIES.

THIRD, BACKING MATERIALS ARE NOT SIGNIFICANT FROM THE SOUND ABSORPTION STANDPOINT SINCE JUTE AND KRAFTCORD PERFORM EQUALLY WELL IN THE SOUND CHAMBERS. THE USE OF LATEX BACKINGS REDUCES SOUND EFFICIENCY SLIGHTLY, BUT IT SHOULD BE USED TO INCREASE TUFT BIND TO NOT LESS THAN TEN POUNDS. MOST IMPORTANT, QUALITY IN BACKING IS STRENGTH TO RESIST TEARING AND PUNCTURE. FOR RESISTANCE TO MOISTURE, JUTE IS PREFERABLE TO KRAFTCORD.

FOURTH, PILE STRUCTURE OR TEXTURE SEEMS TO HAVE LITTLE EFFECT ON A CARPET'S SOUND ABSORPTION EFFICIENCY. SINCE CUT PILE AND LOOP PILE PERFORM EQUALLY WELL ACOUSTICALLY OTHER CONSIDERATIONS GOVERN OUR CHOICE. PARTICULARLY IN THE CASE OF CONTINUOUS FILAMENT NYLON, ROUND OR LOOP WIRE PILE IS PREFERRED FOR GREATER DURABILITY. FOR APPEARANCE SAKE ALSO WE RECOMMEND LOOP PILE BECAUSE IT SHOWS TRACKS LESS THAN CUT PILE. IN CASE OF NYLON, LIGHT TEXTURE BY VARYING PILE HEIGHT IS DESIRABLE, AS LONG AS AVERAGE PILE DEPTH IS EQUAL TO THE .225 INCH MINIMUM FOR LEVEL PILE, TO CONCEAL STREAKS OF THE SAME COLOR SHOWING UP IN TWEED PATTERNS OF TWISTED MULTICOLOR YARN, AND TO MASK TRACKS.

FIFTH, THE ADDITION OF UNDERLAYS, BESIDES INCREASING CARPET LIFE AND GIVING EFFECT OF SOFTNESS AT LESS COST THAN ADDITIONAL PILE DEPTH, MAKES THE MOST SUBSTANTIAL INCREASE IN NOISE REDUCTION COEFFICIENT OF ALL THE FACTORS MEASURED IN THE TESTS. HAIR FELT AND FOAM AND COMBINATIONS OF THE TWO PERFORM EQUALLY WELL. SPONGE RUBBER TENDS TO BE LESS ABSORPTIVE THAN THE OTHERS. FOAM WITH VOIDS FOR SOFTNESS IS TOO SOFT FOR OUR PURPOSE AND UNACCEPTABLE BECAUSE IT TEARS EVEN THROUGH THE BACKING OF THE CARPET. BECAUSE THE PRODUCT IS MOST UNIFORM AND PRACTICAL WE RECOMMEND 1/4 INCH SPONGE U.S. "AIR WEAVE DE LUXE" FOR EXAMPLE.

MATERIAL SPECIFICATIONS FOR ALL PILE FIBER SHOULD CALL FOR THE FOLLOWING:

WOOL:

THOROUGHLY SCOURED CARPET TYPE FIBER. ONLY VIRGIN FIBERS, OR FIBERS RECOVERED FROM THE CARPET YARN MANUFACTURING PROCESS, SHOULD BE USED WITH A MINIMUM OF 85% VIRGIN FIBER. MUST BE PERMANENTLY MOTH PROOFED.

ACRYLIC:

CARPET TYPE FIBER. AVERAGE FIBER DIAMETER OF 15 DENIER OR HIGHER. MINIMUM 85% VIRGIN FIBER.

NYLON:

1. STAPLE NYLON (BLENDED WITH WOOL) CARPET TYPE FIBER. AVERAGE FIBER DIAMETER 14 DENIER OR HIGHER. VIRGIN FIBER, SO GRADED BY PRIME PRODUCER, OR CARPET FIBERS RECOVERED FROM THE CARPET YARN MANUFACTURING PROCESS. MINIMUM 85% VIRGIN FIBER.

2. CONTINUOUS FILAMENT NYLON. HIGH BULK OR TEXTURED CONTINUOUS FILAMENT CARPET-TYPE YARN. FILAMENT SIZE AT LEAST 14 DENIER.

TO SUMMARIZE, WE MAY SAY THAT WOOL PILE FIBER REMAINS THE STANDARD FOR COMPARISON BECAUSE PROPERLY BLENDED IT HAS A COMBINATION OF QUALITIES MOST REQUIRED. DISADVANTAGES ARE A DIMINISHING SUPPLY OF SUITABLE RAW MATERIAL IN RELATION TO INCREASING DEMANDS, AND ALLERGY REACTION BY SOME INDIVIDUALS. ON THE BASIS OF DOLLAR VALUE IT REMAINS THE BEST BUY IN THE CURRENT MARKET IN TERMS OF SOUND ABSORPTION AND DURABILITY, BECAUSE OF PILE DENSITY AVAILABLE, AND MAKES THE BEST APPEARANCE BECAUSE OF RESILIENCE OF THE FIBER AND RESISTANCE TO SOILING.

LIGHTING RESEARCH SUMMARY *

THE HARDEST QUESTION TO ANSWER ABOUT LIGHTING IS HOW MUCH IS REQUIRED. RESEARCH INDICATES THAT FOR THE ABILITY TO SEE IN DETAIL, DISTRIBUTION OR UNIFORMITY IS MORE IMPORTANT THAN QUANTITY TO ACHIEVE WHAT WE MAY TERM QUALITY IN LIGHTING. THE MARVELOUS ABILITY OF THE EYE TO ADAPT THE VARYING LEVELS AND QUALITY OF LIGHT MAKES AN ANSWER TO THE FIRST QUESTION IMPOSSIBLE WITHOUT FEAR OF CONTRADICTION IN THE FUTURE WHEN NEW FACTS ARE LEARNED. THE PUBLISHED STANDARDS ARE BASED ON THE ASSUMPTION THAT THE QUALITY OF LIGHTING IS GOOD FOR RECOMMENDED FOOTCANDLE LEVELS. WE KNOW THAT ACTUAL FIELD CONDITIONS FALL SHORT OF LABORATORY CONDITIONS UNDER WHICH THE RECOMMENDED LEVELS WERE ARRIVED AT FOR VARIOUS TASKS.

IF SEEING IS POSSIBLE UNDER A WIDE RANGE OF LIGHTING CONDITIONS, WE MAY ASK WHAT IS THE IMPORTANCE OF MAKING IT EASY TO SEE. THE ANSWER IS FOUND IN LARGE NUMBER OF ADJUSTMENTS THAT MUST BE MADE BY THE MUSCLES OF THE EYE IN DIRECTING, FOCUSING, AND CONTRACTING OR DILATING THE PUPIL TO ADJUST TO INTENSITY OF LIGHT. TO TRIGGER THESE COMPLICATED REACTIONS REQUIRES A REASONABLE SIGNAL OR STIMULUS. WHEN THIS IS NOT PRESENT MORE EFFORT MUST BE EXPENDED TO COMPENSATE, AND WHILE WE MAY NOT BE CONSCIOUS OF THIS AT THE TIME, THE RESULT MAY OFTEN BE THAT THE MUSCLES ACHE IN A DELAYED REACTION.

THE DELAYED REACTION IS CHARACTERISTIC OF INADEQUATE QUANTITY OR REFLECTED GLARE MASKING CONTRAST BELOW AN ACCEPTABLE LEVEL FOR A SEEING TASK. IN THE CASE OF DIRECT GLARE THE EFFECT ON AND DISCOMFORT OF THE SUBJECT IS IMMEDIATE. BY DIRECT GLARE WE MEAN THE RAYS OF LIGHT WHICH REACH THE EYE WITHOUT REFLECTION DIRECTLY FROM THE SOURCE (EITHER ARTIFICIAL LUMINAIRE OR NATURAL DAYLIGHT). BECAUSE IT IS IMMEDIATELY OBVIOUS, CORRECTION FOR DIRECT GLARE HAS GENERALLY BEEN MADE BY SHIELDING OR DIFFUSION OF ARTIFICIAL LIGHTS, AND WITH BLINDS OR SUNSHADES FOR WINDOWS OR SKYLIGHTS.

SINCE THE AMOUNT OF LIGHT REQUIRED DEPENDS ON THE TASK TO BE PERFORMED RATHER THAN WHERE YOU ARE WHILE PERFORMING IT, WHETHER SCHOOL, OFFICE OR HOME, YOU CANNOT AFFORD TO BE DOGMATIC ABOUT QUANTITY. AFTER ALL, THE TASKS MAY CHANGE IN A GIVEN AREA. THE EVIDENCE POINTS TO THE FACT THAT QUALITY MAY PROVE MORE IMPORTANT THAN QUANTITY IN WHAT CONSTITUTES A GOOD LIGHTING SYSTEM. THIS IS BECAUSE IT TAKES MORE INCREASE IN INTENSITY TO PROVIDE THE CONTRAST NECESSARY FOR SEEING A GIVEN TASK IN THE PRESENCE OF REFLECTED GLARE THAN COULD BE PURCHASED FOR THE SAME DOLLAR VALUE INVESTED IN GLARE REDUCING EQUIPMENT.

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* SCHOOL CONSTRUCTION RESEARCH REPORT NO. 10 FOR DADE COUNTY BOARD OF PUBLIC INSTRUCTION BY PANCOAST/FERENDINO/GRAFTON ARCHITECTS.

THE AIM OF DESIGN SHOULD BE TO PRODUCE AS NEAR AS POSSIBLE THE EFFECT OF INDIRECT LIGHT WITHOUT THE EXCESSIVE COST FOR LIGHTING ENERGY AND THE NECESSITY FOR REMOVING ADDITIONAL HEAT IN AIR CONDITIONED STRUCTURES. TESTS CONDUCTED ON PERFECT DIFFUSED PANELS, GLASS OR PLASTIC LENSES, AND MULTILAYER POLARIZER INDICATE THAT THE BEST QUALITY OF LIGHTING IS PRODUCED BY A LUMINOUS CEILING OF MULTILAYER POLARIZER PANELS.

LIGHT REFELCTED DIRECTLY FROM SOLID FLAT SURFACES TENDS TO BE PREDOMINANTLY HORIZONTALLY PLANE POLARIZED. BY THE USE OF MULTI-LAYER POLARIZER PANELS AT THE LIGHT SOURCE WE REMOVE MOST OF THE HORIZONTALLY POLARIZED LIGHT. THE RESULTING VERTICALLY PLANE POLARIZED LIGHT WILL BE ABSORBED AND THEN REFLECTED AS UNPOLARIZED LIGHT REVEALING TO THE EYE THE CONTRAST, COLOR AND TEXTURE OF THE TASK WITHOUT THE VEILING GLARE OF DIRECT REFLECTED LIGHT PRESENT WITHOUT POLARIZATION.

FOR THE STANDPOINT OF SEEING A GIVEN TASK BRIGHTNESS BALANCE IN A ROOM IS OF HIGH PRIORITY. EXTREMES LIKE THE DARK BLACKBOARDS AND THE NATURAL LIGHT FROM A WINDOW THROW A MONKEY WRENCH IN THE MECHANISM OF THE EYE. YOU ARE NATURALLY DRAWN TO CONTRAST, AND THE EYE MUSCLES MUST READAPT DIRECTION, IRIS OPENING AND FOCUS WHEN YOU RETURN TO THE TASK. WHILE CONTRAST IS ESSENTIAL TO BLACKBOARD VIEWING, AND WHITE CHALK IS THE BEST TO PROVIDE THIS, COLORED CHALKBOARDS ARE A SENSIBLE COMPROMISE FOR HIGHER REFLECTANCE. WINDOWS, PARTICULARLY AT EYE LEVEL, FOR VIEWING SHOULD BE GLAZED WITH GLARE REDUCING GLASS.

RETURNING TO THE ORIGINAL QUESTION OF QUANTITY THE FACT REMAINS THAT THE EYE CAN SEE WITH LESS CONTRAST IN THE TASK WITH A GREATER QUANTITY. WHAT THE BRITISH CALL "THE AMENITY OF LIGHTING" CALLS FOR MORE. GIVEN A DIMMER SWITCH TO CONTROL THEIR OWN ENVIRONMENT MOST SUBJECTS WILL INCREASE THE LEVEL TO THE MAXIMUM WHEN REQUESTED TO ADJUST TO THEIR PREFERENCE.

REGARDING COLOR RENDITION IT WAS ADMITTED THAT FLUORESCENT SOURCES DISTORT COLOR MORE, HOWEVER, THEY HAVE BEEN IMPROVED OVER CERTAIN SPECTRAL AREAS SINCE THEIR INTRODUCTION. IN THIS RESPECT POLARIZED LIGHT IMPROVES COLOR RENDITION BY THE REMOVAL OF THE COLOR OF THE LIGHT SOURCE PRESENT IN REFLECTED GLARE. THE RESULT IS A SATURATION IMPROVEMENT WITH EQUAL REFLECTANCE UNDER VERTICALLY POLARIZED LIGHT. MATERIALS WITH BEAUTY IN THEIR DEPTH LIKE WOOD GRAIN SHOW BETTER UNDER POLARIZED LIGHT.

WHILE IT MAY HAVE VERY DEFINITE PSYCHOLOGICAL EFFECTS ON THE VIEWER, COLOR IS NOT THE FACTOR THAT REFLECTANCE AND CONTRAST ARE IN SEEING A GIVEN TASK. THERE IS A LITTLE LESS GLARE PRESENT WITH WARM THAN WITH COOL COLOR.

COLOR RESEARCH SUMMARY *

COLORS AFFECT OUR MIND AND BODY, THEY DO CAUSE MENTAL AND PHYSICAL REACTIONS IN US, ACCORDING TO THE NATURE OF THE COLOR WE ARE EXPOSED TO.

THESE REACTIONS MAY BE BASED UPON ASSOCIATIONS LINGERING LONG AND DEEP IN OUR SUBCONSCIOUS, UPON PERSONAL PREFERENCES AND EXPERIENCES OF THE IMMEDIATE PAST; OR THEY MAY BE DUE TO PRESENT ENVIRONMENT - THE HOME OR PLACE OF WORK - OR EVEN TO ECONOMIC CONDITIONS AND NATIONAL AND WORLD EVENTS.

SCHOOL ADMINISTRATORS HAVE BECOME AWARE OF THE SALUTARY EFFECTS WHICH SCIENTIFICALLY FORMULATED COLOR SCHEMES MAY HAVE ON STUDENTS AND TEACHERS ALIKE. MODERN SCHOOLROOMS ARE ALIVE WITH COLORS, INTENT TO STIMULATE THE MENTAL POWERS, PREVENT OCULAR FATIGUE AND FOSTER GREATER SOCIABILITY AMONG CHILDREN, THE LACK OF WHICH OFTEN CREATES SERIOUS PERSONALITY TRAITS.

THEN, IN FACTORIES AND OFFICES THE EFFECTS OF COLORS ARE NO LESS STRONGLY IN EVIDENCE. THERE, TOO, PROPERLY BALANCED COLORS ARE CONDUCIVE TO CHEERFULNESS, CLEANLINESS AND RIGHT HUMAN RELATIONS AMONG EMPLOYEES. THEY HELP TO INCREASE EFFICIENCY AND PRODUCTION BY DECREASING WORKER FATIGUE AND ABSENTEEISM; ACCIDENTS ARE CUT TO A MINIMUM BY COORDINATED INDUSTRIAL COLOR CODES FOR INSTANTANEOUS IDENTIFICATION OF PIPES AND LEVERS, FIRST-AID AND SAFETY ZONES.

THE FOREGOING INSTANCES WHERE THE THERAPEUTIC VALUE AND THE EFFECTS OF THE VARIOUS COLORS ARE OBVIOUS HARDLY DO JUSTICE TO THE TREMENDOUS INFLUENCE COLOR WIELDS IN OUR LIFE. THE FIELD IS UNLIMITED. IN CONCLUSION, HOWEVER, EVEN A VERY MUCH CONDENSED ARRANGEMENT OF THE MOST IMPORTANT PSYCHOLOGICAL ATTRIBUTES OF THE COLORS OF THE SPECTRUM MAY GIVE A CLEARER UNDERSTANDING OF THEIR EFFECTS AND USES.

RED IS ASSOCIATED FOREMOST WITH FIRE, BLOOD AND DANGER. IT IS ADVANCING AND AGGRESSIVE IN NATURE. IF USED JUDICIOUSLY, IT IS STIMULATING AND ENERGIZING AND LENDS SPARKLE WHEREVER PUT; IF USED UNWISELY, BODILY DISCOMFORT AND NERVOUS IRRITATION MAY RESULT.

ORANGE VITALIZES MIND AND BODY. YET, BECAUSE OF ITS STRANGE CHARACTER - BEING A MIXTURE OF VIBRANT RED AND YELLOW - EXPERT HANDS HAVE TO APPLY IT; OTHERWISE UNPLEASANTNESS OF ONE SORT OR ANOTHER IS CERTAIN TO FOLLOW.

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* SCHOOL CONSTRUCTION RESEARCH REPORT NO. 12 FOR DADE COUNTY BOARD OF PUBLIC INSTRUCTION BY PANCOAST/FERENDINO/GRAFTON ARCHITECTS.

YELLOW IS THE GAY SUNSHINE. IT IS EXHILARATING; THEREFORE, IT IS THE SAFEST COLOR OF THE SPECTRUM FOR BRIGHTENING UP THINGS. IT IS A POSITIVE COLOR AND TENDS TO STRENGTHEN THE MENTAL POWERS. MANY SCHOOLS USE IT WITH GREAT SUCCESS IN ROOMS FOR SLOW AND BACKWARD PUPILS.

GREEN AND BLUE-GREEN HAVE THE REFRESHING EFFECTS OF ICE, WATER AND VEGETATION IN THE HEAT OF THE SUMMER. THEY HAVE A CALMING, STILLING AND BALANCING INFLUENCE; THEY SOOTH THE BODY, MIND AND SOUL.

BLUE IS COLD, RETIRING AND SEDATIVE IN EFFECTS. HOWEVER, BEING A NEGATIVE COLOR, IT CAN BE DEPRESSING IF USED WITH DISREGARD OF ITS INHERENT NATURE OF DRAWING WITHIN.

BLUE-VIOLET IS THE MOST DEPRESSING OF ALL COLORS, ALTHOUGH IT DOES RELIEVE INSOMNIA AND HYPERTENSION. RED-VIOLET, ON THE OTHER HAND, EXERTS A POWERFUL STIMULUS UPON THE NERVOUS SYSTEM. PERHAPS BECAUSE OF ITS EXCITING VIBRANCY AND RICHNESS, IT WAS FOR CENTURIES AND STILL IS THE DOMINANT HUE FOR POMP AND SPIRITUAL RITUALS. IT SEEMS TO BE THE COLOR THAT SPARKS THE SPIRIT IN MAN.

COLORS USED SHOULD BE LIMITED TO LOW RESPONSE RANGE. SOME COLORS TO AVOID IN SCHOOL INTERIORS ARE: RAW RED, BECAUSE IT OVER STIMULATES; INTENSE ORANGE, BECAUSE IT INCREASES TENSION AND IRRITATES; PURPLE, BECAUSE IT DEPRESSES, IS MELANCHOLY AND AUSTERE; WHITE, BECAUSE IT IS NEUTRAL, NEITHER CALMS NOR STIMULATES. THE COLORS RECOMMENDED ARE THE FOLLOWING:

APRICOT - RANGING FROM WARM IVORY TO A NEAR RUST OR BURNT ORANGE

BLUE - WITH A SLIGHT VIOLET CAST IN VARIOUS VALUES AND INTENSITIES

BUFF - THAT IS NEITHER YELLOWISH NOR REDDISH BUT ENTIRELY NEUTRAL

PEACH-PINK

PALE AQUA BLUE

PALE AZURE BLUE

BLUISH GREEN

NEUTRAL BEIGE

III. FACILITIES REQUIREMENTS

A. DESCRIPTION OF FACILITIES (REFER TO DRAWINGS 1 THROUGH 8)

THE SELECTED SITE ON WHICH THE GOODYEAR AUXILIARY AIRFIELD IS PRESENTLY LOCATED INCLUDES APPROXIMATELY 1,349 ACRES, A SMALL PERCENTAGE OF WHICH IS TRIBAL LAND AND THE BALANCE IS ALLOTTED ACREAGE. THE CENTRAL SECTION OF THE SITE, IN THE AMOUNT OF 194 ACRES, ENCOMPASSED BY THE TWO RUNWAYS, HAS BEEN DEDICATED TO THE LOCATION OF THE FACILITIES.

THE ENTRANCE TO THE CAMPUS IS ON THE NORTH SIDE AND A 4-LANE DIVIDED ROAD, PROPERLY LANDSCAPED TO THE EXTENT OF 100 FEET ON EITHER SIDE, DIRECTS THE INCOMING TRAFFIC TO THE HEART OF THE ACADEMIC-RESIDENTIAL COMPLEX. THIS MAIN ARTERY IS INTERSECTED BY A 2 LANE ROAD RUNNING PERPENDICULAR TO IT AND LEADING TO ALL THE PARKING AREAS OF THE CAMPUS. THE SYSTEM IS COMPLETED WITH ADDITIONAL ROADS, WITH THE N.E. - S.W. RUNWAY CLOSING THE PERIPHERAL BELT. THE PARKING AREAS ARE LOCATED ON THE INNER SIDE OF THIS BELT, MINIMIZING UNNECESSARY AND HAZARDOUS PEDESTRIAN-VEHICULAR INTERSECTIONS. PARKING IS PROVIDED IN A TOTAL OF 1,759 SPACES, DISTRIBUTED ACCORDING TO THE FOLLOWING CRITERIA.

1.	FACULTY AND STAFF	468 CARS	
2.	STUDENTS: COMMUTERS	450 CARS	(90%)
	RESIDENTS	452 CARS	(25%)
3.	FLIGHT TRAINING	198 CARS	
4.	INDUSTRY RESEARCH AND DEVELOPMENT	169 CARS	
5.	VISITORS	22 CARS	
	TOTAL	1,759 CARS	

TWENTY-FIVE PERCENT OF THE STUDENT BODY OF 2,000 ARE ESTIMATED TO BE COMMUTERS, WHILE THE REMAINING SEVENTY-FIVE PERCENT WILL LIVE ON CAMPUS. THE COMBINATION OF ACADEMIC, FLIGHT TRAINING AND RESIDENTIAL FACILITIES IS LOCATED PARALLEL AND NEAR THE N.E. - S.W. RUNWAY. THE COMPLEX SITS ON A PODIUM RAISED FIVE FEET FROM THE EXISTING GRADE. THE ACADEMIC AND FLIGHT TRAINING FACILITITES ARE DEVELOPED IN A BASICALLY TWO-STORY STRUCTURE DESIGNED AROUND A SUCCESSION OF INTERIOR SPACES. OUR CREATIVE IMPULSE HAS GIVEN BIRTH TO A PLEASANT INDOOR ATMOSPHERE LOOKING TOWARD MAN-MADE LANDSCAPED INTERIOR PLAZAS, "THE PRADO", WITH AS MUCH SHELTERED CURCULATION AS POSSIBLE.

THE RESIDENTIAL SPACES ARE DEVELOPED IN A PREDOMINATLY VERTICAL GROWTH, GIVING PUNCTUATION TO THE COMPLEX OF WHICH THEY ARE AN INTEGRAL PART.

THE DIVERSITY OF ACTIVITIES IN THE CAMPUS IS HANDLED THROUGH THE ESTABLISHMENT OF ZONES: ACADEMIC, ADMINISTRATION, FLIGHT TRAINING, STUDENT ACTIVITIES AND RECREATION, RESIDENTIAL, AND INDUSTRY RESEARH AND DEVELOPMENT. EACH ZONE HAS ITS OWN IDENTITY, ACHIEVED THROUGH ITS LOCATION ON THE SITE, AND THEY ARE GROUPED IN A LOGICAL MANNER RELATING THEM TO EACH OTHER, SO THAT THE FINAL RESULT IS AN ORGANIZED PATTERN OF SELECTED ACTIVITIES WORKING AS A WHOLE.

THE ACADEMIC ZONE, BECAUSE OF ITS CENTRAL LOCATION, IS EASILY ACCESIBLE TO BOTH RESIDENTS AND NON-RESIDENTS. IT IS DEVELOPED AROUND INTERIOR LANDSCAPED PATIOS WITH PLENTY OF MILLING SPACES IN BETWEEN AND AROUND THE INSTRUCTIONAL AREAS, TO CREATE A WELCOMING ATMOSPHERE. THIS ZONE INCLUDES: THE CLASSROOM UNITS, LABORATORIES, LIBRARY, AND BASIC RESEARCH AND DEVELOPMENT.

IT IS HOUSED IN A TWO STORY STRUCTURE WITH THE CLASSROOM AND HEAVY PROCESS LABORATORIES ON THE FIRST FLOOR WHILE THE LIBRARY, BASIC RESEARCH AND DEVELOPMENT AND LIGHT PROCESS LABORATORIES OCCUPY THE UPPER FLOOR. THE BASIC RESEARCH AND DEVELOPMENT INCLUDES THE AUDIO-VISUAL CENTER AND THE COMPUTER CENTER. TOILET FACILITIES ARE STRATEGICALLY LOCATED AND COMBINED WITH THE STAIR TOWERS.

THE COMPUTER CENTER WILL BE THE HEART OF THE CAMPUS WHEN COMPUTER SERVICES OR FACILITIES BECOME AVAILABLE. IT WILL SUPPORT THE COMPUTER ASSISTED MULTI-MEDIA LEARNING (CAMML) SYSTEM WITH TERMINALS IN ALL INSTRUCTIONAL AND RESIDENTIAL AREAS, IN EVERY POD, IN EVERY LOUNGE. COMPUTERS WILL BE WIDELY USED IN THE CAMPUS, BY FACULTY AND STUDENTS. THESE MACHINES WILL HAVE THE CAPABILITY OF PROVIDING MANY HUNDREDS OF USERS, LOCATED A REMOTE SITES WITH EFFECTIVE LOW COST, HIGH VOLUME COMPUTER POWER, OPERATING IN A MULTIPLE ACCESS SYSTEM FREQUENTLY REFERRED TO AS TIME-SHARING. THE COMPUTER CENTER WILL HAVE A PAIR OF COMPUTERS WITH PROVISION FOR AUTOMATIC SWITCHOVER IN THE EVENT OF FAILURE. A LIST OF FUNCTIONS AND SERVICES TO BE PROVIDED THROUGH THE COMPUTER FACILITIES AT THE CENTER INCLUDES:

1. CAMML TEACHING (I.E., ON-LINE COMMUNICATION WITH STUDENT CARRELS).

2. CAMML COURSE PROGRAMMING (BY FACULTY AND RESEARCH STAFF).

3. CAMML STUDENT EVALUATION; MONITORING AND RECORDING OF STUDENT PERFORMANCE; PERIODIC REPORTING OF STUDENT PROGRESS.

4. DATA GATHERING AND ANALYSIS FOR STUDIES OF CAMML METHODS.

5. PROBLEM SOLVING (USING FORTRAN, ETC.) BY CONVENTIONAL BATCH PROCESSING, AS WELL AS BY REMOTE TERMINAL.

6. ADMINISTRATIVE DATA PROCESSING, INCLUDING STUDENT RECORD KEEPING, GENERATION OF CLASS AND CARREL SCHEDULES FOR STUDENTS, FINANCIAL ACCOUNTING, BUDGETING AND FORECASTING, ETC.

7. LIBRARY AUTOMATION, COVERING MATERIALS WHICH ARE AVIATION RELATED.

   A. CIRCULATION PROCEDURES.
   B. AUTOMATIC INDEXING, ABSTRACTING.
   C. INFORMATION RETRIEVAL.

8. PROVIDING SERVICE AS NATIONAL DATA BANK FOR ADVANCED AVIATION EDUCATIONAL TECHNIQUES.

9. FLIGHT TRAINING SIMULATORS.

10. ON-LINE ENGINE ANALYSIS, ELECTRONIC TROUBLESHOOTING, ETC.

11. CAMML COURSE PROGRAMMING VIA REMOTE TELETYPE AND PHONE LINES.

   A. FOR STAFF USE FROM THEIR HOMES.
   B. FOR OTHER INSTITUTIONS' USE IN DEVELOPING AND CONTRIBUTING TO THE BANK OF TEACHING PROGRAMS.

THE COMPUTER CENTER WILL BE PROPERLY AIR CONDITIONED AND THE TEMPERATURE AND HUMIDITY WILL BE CONTROLLED AT THE OPTIMUM LEVELS.

THE CLASSROOM UNITS (2) WILL CONSIST OF INSTRUCTIONAL SPACES OF VARIOUS SIZES FOR 10, 25 AND 50 STUDENTS, GROUPED AROUND A COMMON SPACE, ---- "THE RETRIEVAL CENTER" WHICH SERVES AS PREPARATION ROOM, PROJECTION ROOM AND TEACHER WORK AREA AND STORAGE. THE UNIT IS COMPLETED WITH INDEPENDENT STUDY AREAS AND TEACHER WORK-CONFERENCE AREAS.

THE LABORATORIES ON THE FIRST FLOOR WILL BE LOCATED ADJACENT TO THE RUNWAY WHICH WILL BE USED AS A WORK AREA. THESE LABORATORIES WILL BE THOSE IN CLOSER CONTACT WITH AIRPLANES AND ENGINES OR ANY OTHER HEAVY EQUIPMENT. THE LABORATORIES ON THE SECOND FLOOR WILL BE THOSE CLASSIFIED AS LIGHT PROCESSES, AS WELL AS DRAFTING ROOMS.

THE FLIGHT TRAINING ZONE WILL CONSIST OF HANGARS, OPERATIONS BUILDING AND CONTROL TOWER. IT WILL BE LOCATED AT THE SOUTHWEST END OF THE CAMPUS AT THE CLOSEST POINT TO THE LANDING STRIP. THE HEIGHT OF THE CONTROL TOWER (80 FEET) KEEPS THE VISIBILITY TO BOTH ENDS OF THE STRIP WITHIN THE MINIMUM ANGLE OF 35 MINUTES AS RECOMMENDED BY FAA REGULATIONS.

THE ADMINISTRATION ZONE IS LOCATED AT THE END OF THE MAIN ACCESS ROAD, BETWEEN THE ACADEMIC, RESIDENTIAL AND RECREATIONAL ZONES. THE POSSIBILITY OF HEAVY AND NOISY PEDESTRIAN AND VEHICULAR TRAFFIC, AS A CONSEQUENCE OF THIS PREDOMINAT LOCATION IS SOMEWHAT OBVIATED BY PLACING THE ADMINISTRATIVE FACILITIES AT A SECOND STORY LEVEL.

THE STUDENT ACTIVITIES ZONE IS LOCATED AT THE NORTHEAST END OF THE COMPLEX, AND INCLUDES THE GYMNASIUM, THE STUDENT CENTER WITH CAFETERIA, LOUNGES AND STUDENT GOVERNMENT ASSOCIATION. HANDBALL, BASKETBALL AND TENNIS COURTS, AS WELL AS SWIMMING POOL, BASEBALL, SOFTBALL, SOCCER, TOUCH FOOTBALL AND GOLF (PITCH AND PUTT) COURSE ROUND OUT THE OUTDOOR ATHLETIC FACILITIES OF THE CENTER.

THE DORMITORY ZONE IS LOCATED BETWEEN AND IN VERY CLOSE PROXIMITY TO THE ACADEMIC AND RECREATIONAL ZONES. THE RESIDENT POPULATION OF 1,500 STUDENTS IS HOUSED IN AN 8 STORY STRUCTURE RAISED FROM THE GROUND WITH THE FIRST DORMITORY FLOOR AT THE HEIGHT OF A THIRD STORY, TO ALLOW THE HORIZONTAL DAILY PEDESTRIAN TRAFFIC TO FLOW IN BOTH DIRECTION THROUGH PLATFORMS LOCATED AT THE FIRST AND SECOND STORY LEVELS WITHOUT DISTURBING THE RATHER QUIET ATMOSPHERE OF THE RESIDENCE. CONVENIENTLY LOCATED STAIR TOWERS AND ELEVATORS ESTABLISH THE VERTICAL CIRCULATION INTERSECTING THE HORIZONTAL CIRCULATION AT THE ABOVE MENTIONED PLATFORMS.

THE DESCRIBED FACILITIES CONSTITUTE A COMPACT UNIT IN CONTRAST WITH THE CONCEPT OF THE "SPREAD CAMPUS". HOWEVER, THE VARIETY OF OPEN SPACES INCLUDED AND SURROUNDING THE FACILITIES CREATE A PLEASANT INVITING ENVIRONMENT PROPER FOR RELAXATION AND SOCIAL INTERACTION.

THE DORMITORIES HAVE BEEN DESIGNED WITH THE USER IN MIND, TO PROVIDE THE STUDENTS WITH ALL THE NECESSARY REQUIREMENTS SO THAT HE FEELS HIMSELF IN HIS OWN TERRITORY, CAN WORK AT HIS OWN PACE, AND LIVE IN HIS OWN WAY. COMFORT-FREEDOM-PRIVACY-ISOLATION ARE KEY WORDS FOR THE DESIGN OF THE DORMITORIES.

IT IS A FACT THAT STUDENTS OFTEN PREFER APARTMENT HOUSES, EVEN THOUGH THEY ARE MORE EXPENSIVE, BECAUSE THEY ARE PLACES WHICH PROVIDE CONDITIONS WHICH HELP THE STUDENT MAKE BETTER USE OF HIS SPARE TIME AS A POSSIBLE CONTINUATION OF HIS EDUCATION.

ACCORDING TO RECENT SURVEYS AND RESEARCH, TWO ROOMMATES SELDOM STUDY TOGETHER IN THE SAME ROOM AT THE SAME TIME. THUS, THE STUDENT SHOULD HAVE HIS OWN ROOM, REGARDLESS OF HOW SMALL IT IS.

IN THE DORMITORIES, THE STUDENTS: SLEEP, STUDY AND SOCIALLY INTERACT. FOR THE FULLFILMENT OF THESE THREE NEEDS WE HAVE CREATED DIFFERENT KINDS OF SPACES: SINGLE ROOM, GROUP DISCUSSION SPACES, LEISURE AND DATING SPACES.

THE ROOM: A GOOD DESIGN SHOULD MAKE THE ROOM SOMETHING MORE THAN A PLACE TO SLEEP OR RELAX. MANY TIMES DURING THE YEARS SPENT IN COLLEGE, THE STUDENT SHOULD HAVE OPPORTUNITY OF CONCENTRATION AND INTROSPECTION WHICH IT IS POSSIBLE TO GET ONLY IN PRIVACY AND ISOLATION. CONCENTRATION NEEDED FOR THE LEARNING PROCESS ITSELF IS, IN MOST CASES, ACHIEVED ONLY IN SOLITUDE. THE ROOM THUS SHOULD PROVIDE SPACE TO STUDY AS WELL AS SPACE TO SLEEP.

ADEQUATE AIR CONDITIONING AND LIGHTING WILL MAKE THE ROOM A PLEASANT, INTIMATE SPACE FOR THE STUDENT. ONLY WHEN THIS OCCURS WILL THE ROOM ASSUME ITS ROLE AS A PARTNER TO THE CLASSROOM, BECOMING A PLACE WHERE SUPPLEMENT AND REINFORCEMENT OF THE ACADEMIC PROGRAM CAN TAKE PLACE.

THE CONVENIENT GROUPING OF ROOMS TO FORM "CLUSTERS" WILL ACT AS A SOCIAL ADHESIVE TO COUNTERACT THE "INDIVIDUALISM" OF PERSONAL, SINGLE OCCUPANCY ROOMS.

DISCUSSION SPACES ARE PROVIDED IN THE DORMITORY BUILDINGS, GIVING STUDENTS ACCESS TO A VARIETY OF LEARNING AIDS. THESE SPACES WILL BE CONDUCIVE TO GROUP DISCUSSIONS.

LOUNGES: WE DO NOT FAVOR LARGE LOUNGE AREAS HAVING FORMAL FURNITURE ARRANGEMENTS WHICH ARE ALWAYS REJECTED BY STUDENTS.

WE FAVOR INSTEAD THE PROLIFERATION OF MEDIUM-SIZED, RATHER SMALL AREAS WITH A WARM, PLEASANT, INVITING ATMOSPHERE, PROPER FOR CAREFREE DATING AS WELL AS SMALL-GROUP STUDY SESSIONS. THIS TYPE OF LOUNGE OR DATING SPACE, TOGETHER WITH THE INSTRUCTIONAL-INDIVIDUAL AREAS AND THE ROOM ITSELF WILL GIVE THE STUDENT THE OPPORTUNITY TO CHOOSE THE KIND OF ENVIRONMENT MOST SUITABLE FOR HIS STUDY OR SOCIAL HABITS.

CONVENIENTLY LOCATED SNACK AREAS WITH VENDING MACHINES HELP ROUND OUT DORMITORY FACILITIES AS ATTRACTIVE PLACES FOR STUDENT LIVING.

ELECTRONIC EDUCATIONAL AIDS: WITHOUT DEFINING SPECIFIC EQUIPMENT TO BE INSTALLED, IT WAS DECIDED TO DEVELOP THE ELECTRONIC CAPABILITIES REQUIRED. THIS WOULD PROVIDE THE NECESSARY INFORMATION FOR ARCHITECTURAL PLANNING OF THE SPACE, ALONG WITH ACCESS REQUIREMENTS FOR CABLING, ETC.

THE SPECIFIC EQUIPMENT AND SYSTEMS TO BE INSTALLED WILL BE SELECTED BY EXPERTS IN THIS FIELD DURING THE DETAILED DESIGN PHASE OF THE PROJECT. HOWEVER, THE CAPABILITIES SCHEDULE, AS SHOWN ON THE NEXT PAGE, WILL PERMIT THE IMPLEMENTATION OF THE EDUCATIONAL PHILOSOPHY AND TECHNOLOGY DISCUSSED EARLIER. THESE CAPABILITIES WILL ACCOMMODATE THE USE OF EXISTING AUDIO-VISUAL, MULTI-MEDIA EQUIPMENT AND THE MORE SOPHISTICATED EQUIPMENT OF THE FUTURE. FOUR, EIGHT-CHANNEL TELEVISION CIRCUITS ARE CONSIDERED ADEQUATE TO MEET THE OVERALL EDUCATIONAL TELEVISION NEEDS OF THE CENTER. ALSO, A STUDENT-CARREL RATIO OF 3 TO 1 WAS USED FOR ARCHITECTURAL PLANNING PURPOSES.

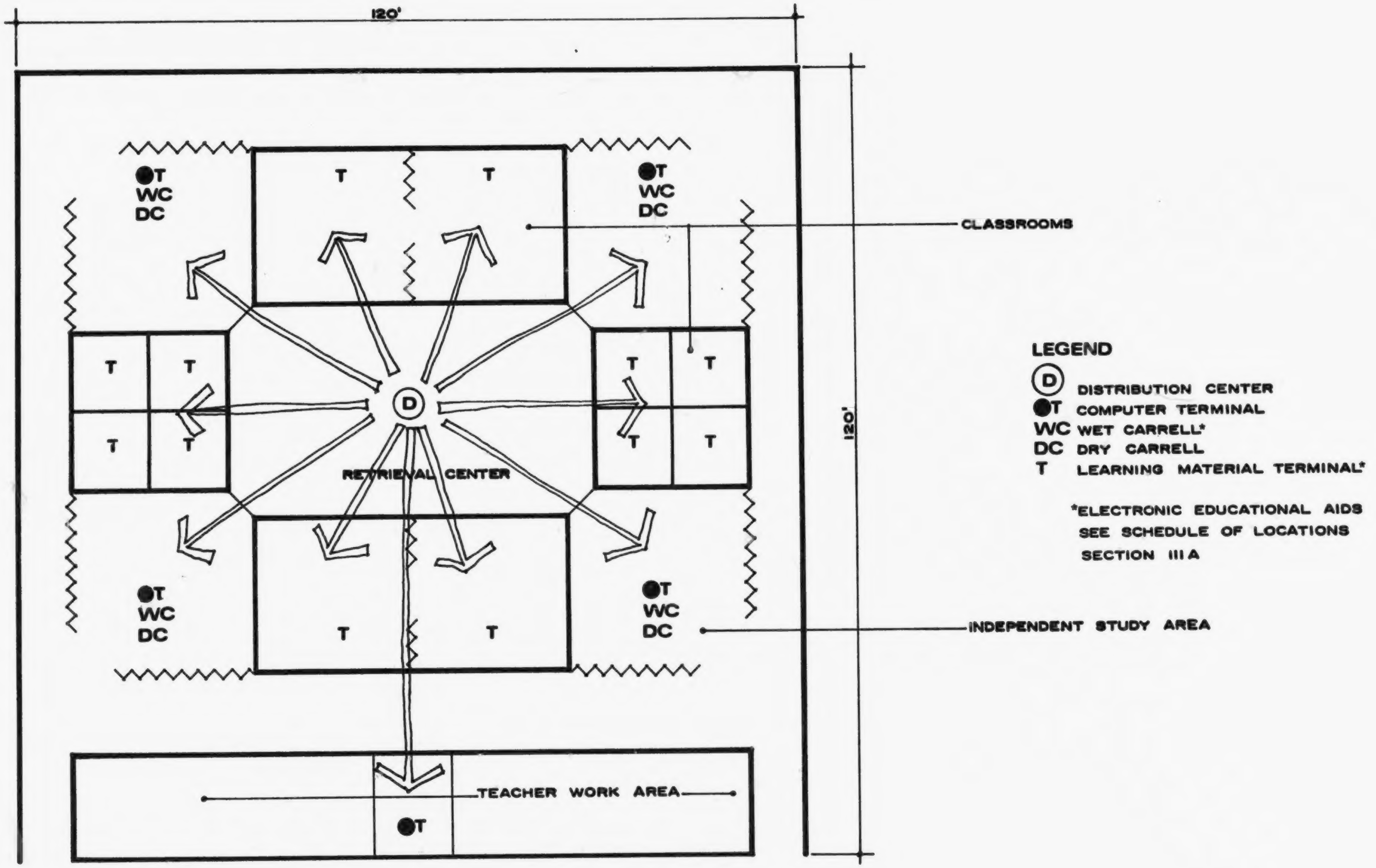
SCHEDULE OF LOCATION
OF
ELECTRONIC EDUCATIONAL AIDS

LEGEND

1. PLUG-IN TV RECEIVER
2. BLOW-UP OF TV SCREEN (RECEIVER)
3. TV TRANSMITTER
4. 2 WAY COMMUNICATION (RESPONDER)
5. DIAL-ACCESS SYSTEM AND COMPUTER ACCESS
6. AUDIO-VISUAL EQUIPMENT (2-110V OUTLETS AND 2 SOUND JACKS)

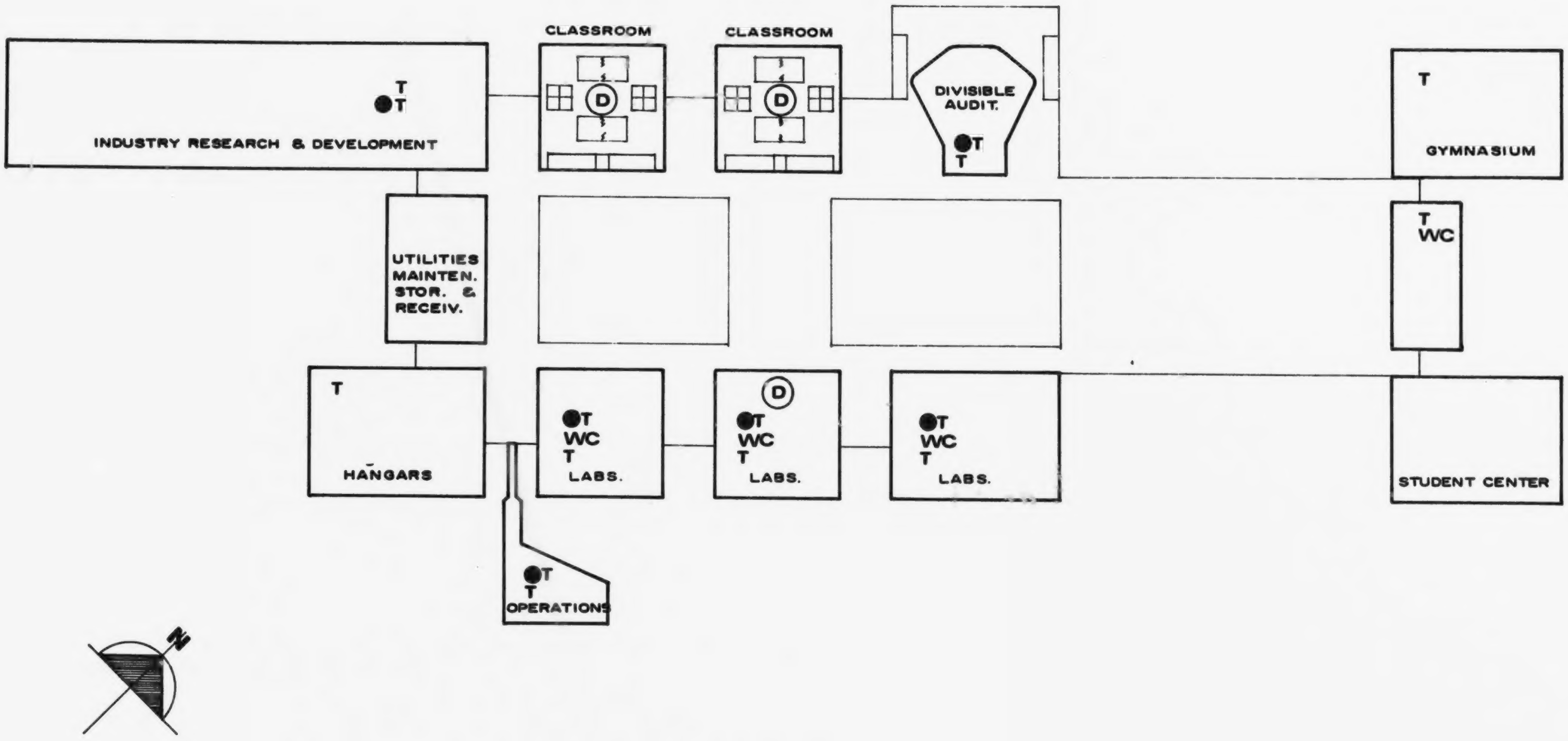
SCHEDULE

DESCRIPTION OF SPACE	1	2	3	4	5	6
ADMINISTRATION	*		*			
ACADEMIC	*	*	*	*	*	*
CORRIDORS & PUBLIC SPACES	*					
LABORATORIES	*		*	*	*	*
DORMITORIES	*				*	*
STUDENT CENTER	*		*	*	*	*
INDEPENDENT STUDY AREAS OR INSTRUCTORS AREAS	*		*	*	*	*
RESEARCH & DEVELOPMENT	*		*	*	*	
GYMNASIUM	*					


120'
120'
T
●T
WC
DC
CLASSROOMS
RETRIEVAL CENTER
D
INDEPENDENT STUDY AREA
TEACHER WORK AREA
LEGEND
D DISTRIBUTION CENTER
●T COMPUTER TERMINAL
WC WET CARRELL*
DC DRY CARRELL
T LEARNING MATERIAL TERMINAL*
*ELECTRONIC EDUCATIONAL AIDS
SEE SCHEDULE OF LOCATIONS
SECTION III A

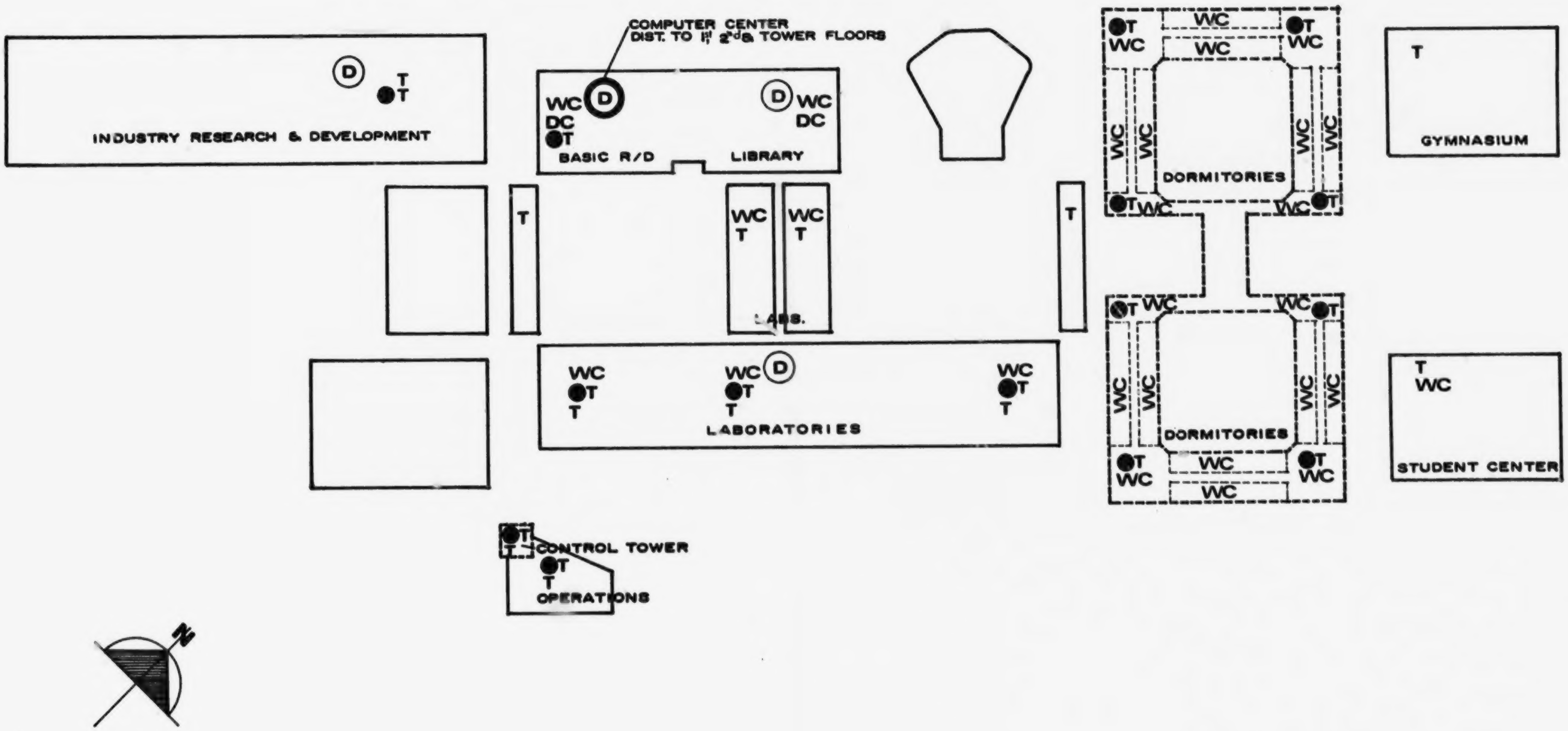
CLASSROOM POD

COMPUTER-ASSISTED
MULTI-MEDIA LEARNING SYSTEM

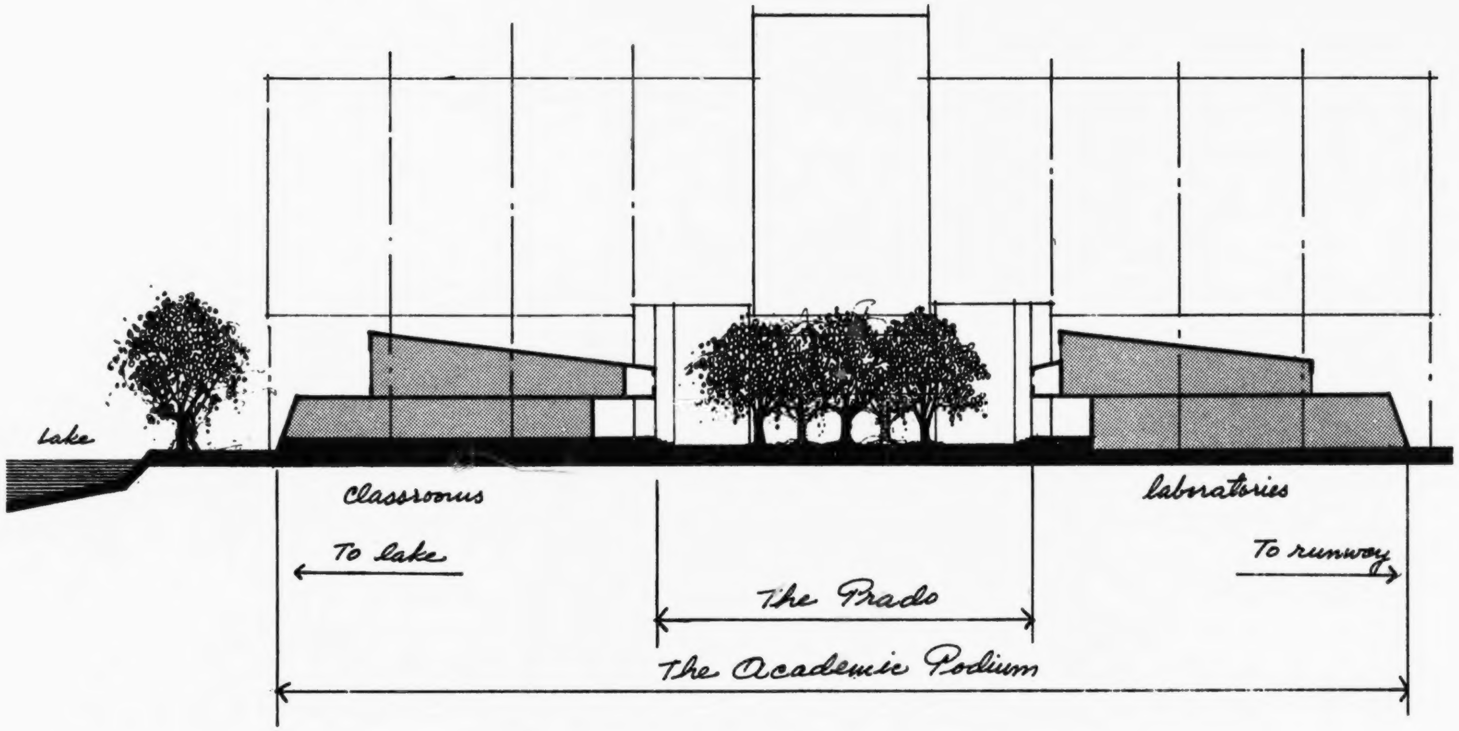

CLASSROOM
CLASSROOM
T
●T
INDUSTRY RESEARCH & DEVELOPMENT
D
D
DIVISIBLE AUDIT.
●T
T
T
GYMNASIUM
T
WC
UTILITIES MAINTEN. STOR. & RECEIV.
T
HANGARS
●T
WC
T
LABS.
D
●T
WC
T
LABS.
●T
WC
T
LABS.
STUDENT CENTER
●T
T
OPERATIONS
N

SCALE: 1"= 100'

FIRST FLOOR PLAN


INDUSTRY RESEARCH & DEVELOPMENT
D
T
T
COMPUTER CENTER
DIST. TO 1st 2nd & TOWER FLOORS
WC
D
DC
T
BASIC R/D
D
WC
DC
LIBRARY
T
WC
T
WC
T
LABS.
T
WC
T
T
WC
D
T
T
WC
T
T
LABORATORIES
T
WC
WC
WC
WC
WC
DORMITORIES
WC
WC
WC
WC
WC
WC
WC
WC
WC
WC
DORMITORIES
WC
WC
WC
WC
T
GYMNASIUM
T
WC
STUDENT CENTER
T
T
CONTROL TOWER
T
T
OPERATIONS
N
SCALE: 1" = 100'

SECOND FLOOR PLAN


Lake
Classrooms
Laboratories
To lake
To runway
The Prado
The Academic Podium

B. CURRICULUM ANALYSIS

INTRODUCTION

THE ARIZONA STATE UNIVERSITY CURRICULA FOR THE MAINTENANCE TECHNICIAN PROGRAM AND THE THREE OPTIONS FOR THE DEGREE PROGRAM, AS DEVELOPED IN THE ORIGINAL FEASIBILITY STUDY, ARE REPEATED AGAIN IN THIS REPORT FOR READY REFERENCE ON THE NEXT FOUR PAGES. THESE PROGRAMS FORM THE PRIMARY BASIS FOR THE FACILITY REQUIREMENTS DEVELOPED IN THIS REPORT.

BASED ON CURRENT ENROLLMENTS AND AN ESTIMATE OF FUTURE ENROLLMENTS IN THE VARIOUS PROGRAM OPTIONS, A DETAILED STUDY OF SPACE REQUIREMENTS FOR CLASSROOMS AND LABORATORIES WAS CONDUCTED. IT WAS RECOGNIZED THAT STRUCTURE AND SPACE UTILIZATION MUST BE DESIGNED INITIALLY TO CONDUCT THE PROGRAMS IN THE TRADITIONAL MANNER, WITH SUFFIECIENT FLEXIBILITY DESIGNED INTO THE STRUCTURES TO ACCOMMODATE THE COMPUTER-ASSISTED, MULTI-MEDIA CONCEPTS OF THE FUTURE. AN ACTUAL SCHEDULING PROGRAM WAS SIMULATED BASED ON A TRADITIONAL APPROACH TO INSURE THAT THE PROGRAM COULD BE CARRIED OUT EMPLOYING EXISTING METHODS AND TECHNIQUES PRIOR TO THE INTRODUCTION OF INNOVATIVE, ADVANCED EDUCATIONAL METHODS.

ARIZONA STATE UNIVERSITY

PROPOSED MAINTENANCE TECHNICIAN TRAINING PROGRAM

1st YEAR

FIRST SEMESTER		HRS.	SECOND SEMESTER		HRS.
EN 101	FIRST YEAR ENGLISH	3	EN 102	FIRST YEAR ENGLISH	3
MA 117	COLLEGE ALGEBRA	3	MA 118	TRIGONOMETRY	3
TA 180	A/C & AEROSPACE STRUCT.	3	TA 181	A/C & AEROSPACE MAINT.	3
WT 166	AERONAUTICAL WELDING	3	TD 112	DESCRIPTIVE GEOMETRY	2
TM 161	METAL PROCESSES	3	CH 113	GENERAL CHEMISTRY	4
TD 111	TECHNICAL DRAWING	2	IA 109	TECHNICAL PROBLEMS	2
		17			17

SUMMER SESSIONS

FIRST SESSION			SECOND SESSION		
GB 101	INTRO. TO BUSINESS	3	TD 380	AERO DWG. & DESIGN	2
EE 226	NUMERICAL METHODS	2	GB 305	BUSINESS LAW	3
		5			5

2ND YEAR

FIRST SEMESTER			SECOND SEMESTER		
TA 287	A/C & AEROSPACE PWPLT	3	TA 288	A/C & AEROSP PWPLT MAINT	3
CH 114	GENERAL CHEMISTRY	4	PH 112	GENERAL PHYSICS	4
PH 111	GENERAL PHYSICS	4	ME 380	APPLIED THERMODYNAMICS	3
TE 200	ELECTRICITY & ELECTRONICS	3	TA 307	AEROSPACE ORIENTATIONS	2
TA 384	AIRPORT PLANNING	2	ME 330	METALLURGY	3
ME 230	MATERIALS & INDUST. PROC.	2	TA 306	AEROSP ELECT & ELECT SYS	2
		18			17

SUMMER SESSIONS

FIRST SESSION			SECOND SESSION		
TA 300	AIRCRAFT DESIGN	2	TA 301	APPLIED AERODYNAMICS	2
TA 308	COMBUSTION ANALYSIS	2	TA 388	PROPULSION	3
TA 310	PRIN. VERT. TAKE-OFF A/C	2			
		6			5

OPTION I
AERONAUTICAL TECHNOLOGY PATTERN

FRESHMAN

FIRST SEMESTER	HRS.	SECOND SEMESTER	HRS.
1-EN 101 FIRST YEAR ENGLISH	3	1-EN 102 FIRST YEAR ENGLISH	3
1-MA 117 COLLEGE ALGEBRA	3	1-MA 118 TRIGONOMETRY	2
TA 180 A/C & AEROSPACE STRUCT.	3	TA 181 A/C & AEROSPACE MAINT.	3
TM 161 METAL PROCESSES	3	WT 166 AERONAUTICAL WELDING	3
TD 111 TECHNICAL DRAWING	2	TD 112 DESCRIPTIVE GEOMETRY	2
1-PE 101 FRESHMAN PHYSICAL EDUCATION	0.5	ME 230 MATERIALS & INDUST. PROC.	2
1-AS 101 BASIC AIR SCIENCE	2.5	3-GB 101 INTRODUCTION TO BUSINESS	3
	17.0	1-PE 102 FRESHMAN PHYSICAL ED.	0.5
		1-AS 102 BASIC AIR SCIENCE	0.5
			19.0

SOPHOMORE

FIRST SEMESTER	HRS.	SECOND SEMESTER	HRS.
TA 287 A/C & AEROSPACE PWPLT.	3	TA 288 A/C & AEROSP PWPLT MAINT	3
IA 109 TECHNICAL PROBLEMS	2	1-PH 112 GENERAL PHYSICS	4
1-PH 111 GENERAL PHYSICS	4	1-CH 114 GENERAL CHEMISTRY	4
1-CH 113 GENERAL CHEMISTRY	4	TE 300 DIRECT CURRENT CIRCUITS	3
TE 200 ELECTRICITY & ELECTRONICS	3	ME 380 APPLIED THERMODYNAMICS	3
TA 307 AEROSPACE ORIENTATIONS	2	1-AS 202 BASIC AIR SCIENCE	2.5
1-AS 201 BASIC AIR SCIENCE	0.5		19.5
	18.5		

JUNIOR

FIRST SEMESTER	HRS.	SECOND SEMESTER	HRS.
TA 300 AIRCRAFT DESIGN	2	TA 301 APPLIED AERODYNAMICS	2
3-HU UPPER DIVISION	3	3-HU UPPER DIVISION	3
TA 306 AEROSP ELECT. & ELECT. SYS.	2	TA 384 AIRPORT PLANNING	2
TA 308 COMBUSTION ANALYSIS	2	TA 388 PROPULSION	3
TA 310 PRIN. VERT. TAKEOFF A/C	2	TD 380 AERO DRAWING & DESIGN	2
EE 226 NUMERICAL METHODS	2	TA 389 AEROSPACE MFG. ANALYSIS	2
ME 330 METALLURGY	3	TA 486 FLIGHT OPERATIONS MGMT.	2
ME 381 APPLIED THERMODYNAMICS	3	APPROVED ELECTIVES	3
	19.0		19.0

SENIOR

FIRST SEMESTER	HRS.	SECOND SEMESTER	HRS.
TA 390 SYSTEMS ANALYSIS	2	TA 487 A/C & AEROSPACE DESIGN	3
TA 488 AIRLINE MANAGEMENT	2	TA 490 AEROSPACE SYS. ANALYSIS	3
TD 400 TECHNICAL WRITING	3	TA 498 PRO-SEMINAR	3
TA 498 PRO-SEMINAR	3	SS ELECTIVES - UPPER DIVISION	3
SS ELECTIVES - UPPER DIVISION	3	APPROVED ELECTIVES	7
APPROVED ELECTIVES	6		19.0
	19.0		

SUGGESTED ELECTIVES

TA 182	AIR NAVIGATION	3
TA 183	GLIDER PILOT RATING	2
TA 185	PRIVATE PILOT CERTIFICATE	1-3
TA 382	ADVANCED AIR NAVIGATION	2
TA 383	INSTRUMENT RATING	2
TA 385	COMMERCIAL PILOT CERT.	2-8
TA 386	FLIGHT INSTRUCTORS RATING	2
TA 387	MULTI-ENGINE RATING	1
TD 340	FLUIDS	3
ME 301-302	SCI. & TECH. IN HIST.	3 EA.
ME 332	MANUFACTURING DESIGN	2
3-MG 301	PRINCIPLES OF MANAGEMENT	3
3-GB 305	BUSINESS LAW	3
IE 322	WORK ANALYSIS & DESIGN	3
IE 439	SUPERVISION & LABOR	2
IA 443	SAFETY	2
1-MA 120-121	ANAL. GEOM. & CALCULUS	4 EA.
1-MA 212	ANALYTICAL GEOM. & CALCULUS	4
1-MA 220	DIFFERENTIAL EQUATIONS	3
1-MA 360	DIFF. EQ. & FOURIER ANALY.	3
EE 326	NUMERICAL METHODS	3

OPTION II
AIR TRANSPORTATION
PILOT TRAINING PROGRAM PATTERN

JUNIOR

	FIRST SEMESTER	HRS.		SECOND SEMESTER	HRS.
TA 182	AIR NAVIGATION	3	TA 309	RADIO OPERATION	2
TA 300	AIRCRAFT DESIGN	2	TA 311	AIR TRAFFIC CONTROL	2
TA 302	METEOROLOGY	3	TA 312	INSTRUMENTS AND INSTR SYSTEMS	2
TA 303	FEDERAL AIR REGULATIONS	2	TA 382	ADVANCED AIR NAVIGATION	2
TA 305	WEIGHT AND BALANCE	1	TA 384	AIRPORT PLANNING	2
TA 306	AEROSP ELECT & ELECT SYS.	2	TA 388	PROPULSION	3
TA 308	COMBUSTION ANALYSIS	2	3-HU	UPPER DIVISION	3
3-HU	UPPER DIVISION	2			
		17			16
TA 185	PRIMARY FLIGHT TRAINING	3	TA 385	ADVANCED FLIGHT TRAINING	3
	TOTAL CLOCK HOURS	40		TOTAL CLOCK HOURS	40

SUMMER SESSION

KE 320	METALLURGY	3
MG 301	PRINCIPLES OF MANAGEMENT	3
	ELECTIVES AND/OR DEFICIENCIES	6
		12
TA 385	ADVANCED FLIGHT TRAINING	3
	TOTAL CLOCK HOURS	40

SENIOR

	FIRST SEMESTER	HRS.		SECOND SEMESTER	HRS.
TA 389	AEROSPACE MFG. ANALYSIS	2	TA 486	FLIGHT OPERATIONS MGMT.	2
TA 390	SYSTEMS ANALYSIS	2	TA 487	AIRCRAFT DESIGN	3
TA 391	AIRPORT OPERATION	2	TA 492	ACCIDENT INVESTIGATION	3
TA 488	AIRLINE MANAGEMENT	2	TA 493	AIRLINE ADMINISTRATION	2
TA 491	AVIATION SAFETY	2	TA 498	PRO-SEMINAR IN AIR TRANSP.	3
TD 400	TECHNICAL WRITING	3	SS	ELECTIVES - UPPER DIVISION	3
SS	ELECTIVES - UPPER DIVISION	3			
		16			16
TA 385	ADVANCED FLIGHT TRAINING	2	TA 383	ADVANCED FLIGHT & INSTRUMENT RATING	2
	TOTAL CLOCK HOURS	40		TOTAL CLOCK HOURS	40

SUMMER SESSION

ELECTIVES AND/OR DEFICIENCIES	12 SEMESTER HOURS
TA 386 & TA 387 ADVANCED FLIGHT AND INSTRUMENT RATING	10 TO 40 CLOCK HOURS

OPTION III
AIR TRANSPORTATION
AVIATION MANAGEMENT TRAINING PATTERN

JUNIOR

	FIRST SEMESTER	HRS.
TA 300	AIRCRAFT DESIGN	2
TA 306	AEROSP ELECT. & ELECT. SYS.	2
TA 308	COMBUSTION ANALYSIS	2
HU	UPPER DIVISION	2
MG 301	PRINCIPLES OF MANAGEMENT	3
EE 226	DIGITAL COMPUTER PROGRAMMING	2
IE 322	WORK ANALYSIS & DESIGN	3
GB 341	TRANSPORTATION	3
		19

	SECOND SEMESTER	HRS.
TA 301	APPLIED AERODYNAMICS	2
TA 384	AIRPORT PLANNING	2
TA 388	PROPULSION	3
TA 390	SYSTEMS ANALYSIS	2
KE 320	METALLURGY	3
KE 389	PROGRAM CONTROL METHODS	2
HU	UPPER DIVISION	3
GB 305	BUSINESS LAW	3
		20

SENIOR

	FIRST SEMESTER	HRS.
TA 303	CIVIL AIR REGULATIONS	2
TA 391	AIRPORT OPERATION	2
TA 488	AIRLINE MANAGEMENT	2
TA 491	AVIATION SAFETY	2
TA 498	PRO-SEMINAR IN AIR TRANSP.	3
TD 400	TECHNICAL WRITING	3
SS	ELECTIVES - UPPER DIVISION	3
GB 461	AIR TRANSPORTATION	3
		20

	SECOND SEMESTER	HRS.
TA 311	AIR TRAFFIC CONTROL	2
TA 486	FLIGHT OPERATIONS MGMT.	2
TA 487	AIRCRAFT DESIGN	3
TA 492	ACCIDENT INVESTIGATION	3
TA 493	AIRLINE ADMINISTRATION	2
TA 498	PRO-SEMINAR IN AIR TRANSP.	3
SS	ELECTIVES - UPPER DIVISION	3
		18

SPACE REQUIREMENTS

THE PURPOSE OF THIS PORTION OF THE PROGRAM IS TO DETERMINE SQUARE FOOTAGES AND SPACE RELATIONSHIPS FOR THOSE PORTIONS OF THE AIR CENTER WHICH ARE MOST INTIMATELY RELATED TO INSTUCTION:

I. CLASSROOM, CONFERENCE, AND TEACHER SPACE.

II. LABORATORIES.

III. LIBRARY.

IV. BASIC RESEARCH AND DEVELOPMENT.

V. ADMINISTRATION

THE TWO FACTORS, QUANTITY AND RELATIONSHIP, WERE ARRIVED AT THROUGH INFORMATION CONTAINED IN THE FEASIBILITY STUDY, *ANALYSIS OF CLASSROOM AND LABORATORY SPACE REQUIREMENTS*, *EDUCATIONAL FACILITIES SPECIFICATIONS*, *ANALYSIS OF FACULTY REQUIREMENTS*, AND CONFERENCES WITH VARIOUS PRINCIPALS AT THE UNIVERSITY IN ARIZONA

I. CLASSROOM, CONFERENCE AND TEACHER SPACE

EACH STUDENT ACCORDING TO THE PROPOSED PROGRAM, WILL TAKE 19 HOURS OF COURSES. THIS MEANS HE WILL BE IN CLASS A MAXIMUM OF 19 HOURS, WHICH EQUALS 19/45 OF THE TIME AVAILABLE TO ONE STUDENT POSITION DURING A GIVEN WEEK. CLASSES ARE SCHEDULED FOR NINE PERIODS PER DAY, FIVE DAYS PER WEEK. THUS 19/45 x 2,000 STUDENTS EQUALS 844 STUDENTS TO BE IN CLASS AT ANY GIVEN TIME. ASSUMING A 95 PERCENT UTILIZATION RATE, THE NUMBER OF STUDENT STATIONS NEEDED FOR LECTURE EQUALS 888. ALTHOUGH SECONDARY SCHOOLS REACH THIS UTILIZATION RATE AT ABOUT 1,500 PUPILS, WITH GOOD SCHEDULING, COLLEGES FREQUENTLY (IF NOT GENERALLY) DO NOT. THE IMMUTABLE 25-STUDENT-STATION CLASSROOM MUST OFTEN HOUSE FEWER THAN 25 STUDENTS. THE DISPARITY THAT APPEARS EACH TIME THIS OCCURS MUST BE MADE UP IN A NEW CLASSROOM. THE FREQUENCY WITH WHICH IT OCCURS IS GREAT ENOUGH TO CONSIDERABLY INCREASE THE NUMBER OF CLASSROOMS AND TO CONSIDERABLY DECREASE THE UTILIZATION FACTOR. MUTABILITY OF THE SPACE PROPOSED IN THIS SECTION WILL OFF-SET THIS LIABILITY; HOWEVER, AS A COMPROMISE, 1,000 STUDENT STATIONS ARE PROPOSED IN THE CR COMPONENT.

THE CR COMPONENT IS CONCEPTUALIZED IN TWO MAJOR UNITS WITH THEIR SUBDIVISIONS, EACH CONSISTING OF VARIOUS COMPONENTS:

UNIT I

A. 2 CR (100 STUDENTS) JOINED - DIVISIBLE AT 1,200 SQ. FT. EQUALS 2,400 SQ. FT.
1 SIX-TEACHER WORK, CONFERENCE AREA AT 750 SQ. FT. EQUALS 750 SQ. FT.

B. 2 CR (25 STUDENTS) JOINED - DIVISIBLE AT 300 SQ. FT. EQUALS 600 SQ. FT.
3 CR (10 STUDENTS) AT 150 SQ. FT. EQUALS 450 SQ. FT.
1 INDEPENDENT STUDY AREA (25 STUDENTS) AT 750 SQ. FT. EQUALS 750 SQ. FT.
2 FOUR-TEACHER WORK, CONFERENCE AREAS AT 500 SQ. FT. EQUALS 1,000 SQ. FT.

C. 2 CR (50 STUDENTS) JOINED - DIVISIBLE AT 600 SQ. FT. EQUALS 1,200 SQ. FT.
5 CR (10 STUDENTS) AT 150 SQ. FT. EQUALS 750 SQ. FT.
1 INDEPENDENT STUDY ARE (50 STUDENTS) AT 1,500 SQ. FT. EQUALS 1,500 SQ. FT.
2 SIX-TEACHER WORK, CONFERENCE AREAS AT 750 SQ. FT. EQUALS 1,500 SQ. FT.

SUBTOTAL FOR UNIT I 10,900 SQUARE FEET

UNIT II

SAME AS UNIT 1

SUBTOTAL FOR UNIT II 10,900 SQUARE FEET

TOTAL FOR UNIT I AND UNIT II 21,800 SQUARE FEET

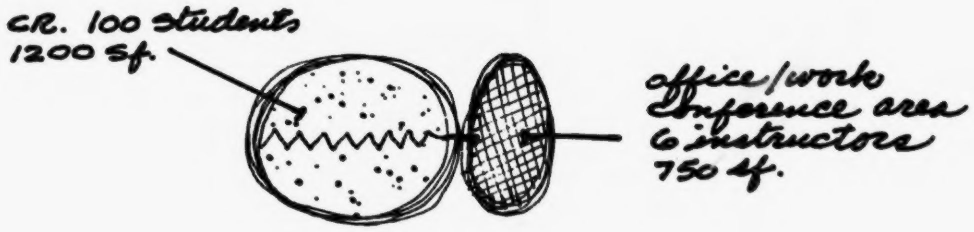
EACH UNIT PROVIDES 500 STUDENT STATIONS AND A MINIMUM OF 26 INSTRUCTORS IN OFFICES WITH WORK AND CONFERENCE AREAS. CLASSROOMS, FOR LARGE GROUPS (25-200), ARE CONSIDERABLY SMALLER THAN THE 20 SQUARE FEET PER STUDENT AGREED UPON IN PRELIMINARY DISCUSSIONS AND 20 SQUARE FEET PER STUDENT IN THE AVERAGE, VARIED-USE CLASSROOM IS NOT OVERLY GENEROUS. THE RATIO

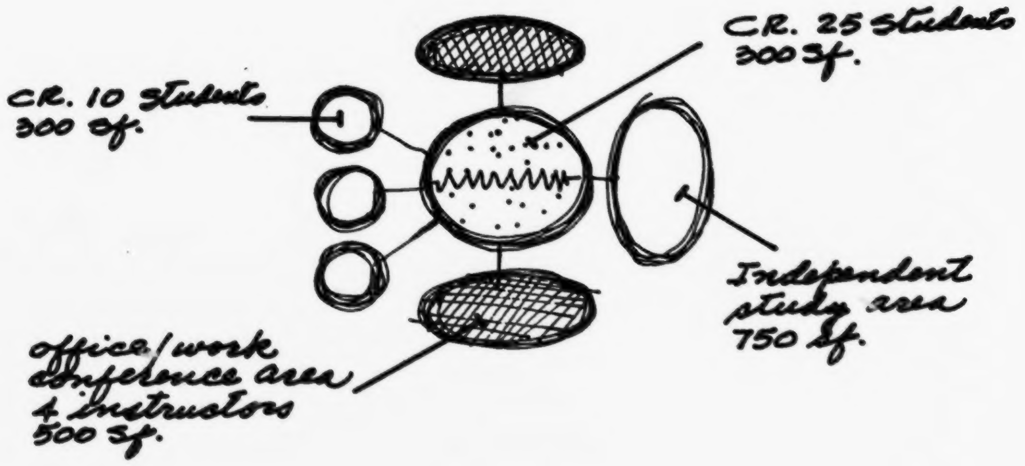
ARRIVED AT HERE IS BASED ON 12 SQUARE FEET PER STUDENT - THE HIGH STANDARD FIGURE FOR FIXED TABLET-ARM SEATING IN AUDITORIUM INSTALLATIONS. THIS RATIO WAS SELECTED IN VIEW OF THE FACT THAT THE ONLY USE FOR THESE AREAS IS LECTURE. OTHER CONFERENCE, GROUP, AND INDIVIDUAL ACTIVITIES ARE PROVIDED FOR IN ADJACENT AND CONTINGENT SPACES. ALSO, THE LARGE NUMBER OF INDIVIDUAL, AUTOMATED CARRELS TO BE LOCATED IN THE DORMITORIES AND THE TEACHER-CONFERENCE AREAS WILL REDUCE THE FORMAL CLASSROOM REQUIREMENTS. CR COMPONENTS FOR TEN STUDENTS ARE SET AT 150 SQUARE FEET IN ACCORDANCE WITH STANDARD ARCHITECTURAL REQUIREMENTS FOR CONFERENCE SEATING AROUND A TABLE FOR UP TO TEN PARTICIPANTS. INDIVIDUAL STUDENT STUDY AREAS ARE PROJECTED ON ABOUT 30 SQUARE FEET PER STUDENT, WHICH IS THE AMOUNT REQUIRED FOR A SECRETARY AT HER DESK. CARRELS WOULD BE EQUIVALENT IN SIZE TO THE SECRETARIAL DESK. TEACHER WORK AREAS ALLOW (WITH MINIMUM, STATED OCCUPANCY) 25 SQUARE FEET OF DESK SPACE, 25 SQUARE FEET OF LIBRARY, 25 SQUARE FEET WORK SPACE AND A SMALL CONFERENCE SPACE OF 100 SQUARE FEET FOR EACH 2 INSTRUCTORS. IF INCREASED INSTRUCTOR RATIOS OBTAIN, SOME CONFERENCE AREA CAN BE CONVERTED TO THIS USE.

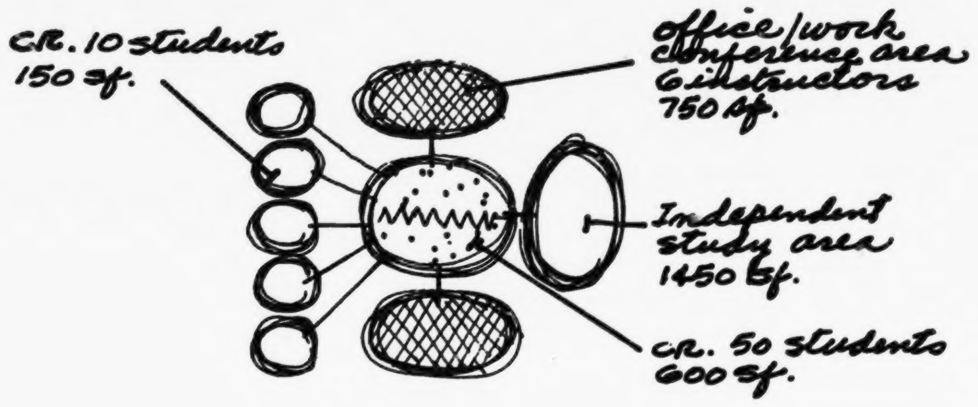
THE FOUR CLASSROOMS OF 100 STUDENTS EACH (2 CR FOR EACH UNIT) ARE GROUPED TO CONSTITUTE A DIVISIBLE AUDITORIUM.

CLASSROOM/CONFERENCE/TEACHER SPACE

TYPICAL UNIT


CR. 100 students
1200 sf.
office/work
conference area
6 instructors
750 sf.


CR. 25 students
300 sf.
CR. 10 students
300 sf.
Independent
study area
750 sf.
office/work
conference area
4 instructors
500 sf.


CR. 10 students
150 sf.
office/work
conference area
6 instructors
750 sf.
Independent
study area
1450 sf.
CR. 50 students
600 sf.

Students stations each unit —— 500
number of units —— 2
Total student stations —— 1000
Instructors in offices per unit 26(min)

Large group lecture rooms
(25-200 students) —— 12sf/student
Small group discuss. rooms
(10 students) —— 15sf/student
Individual study areas (carrels)
(25-50 students) —— 25sf/student

II. LABORATORIES

EACH LABORATORY IS DISCUSSED IN THE ORDER IN WHICH IT APPEARS IN THE LABORATORY TALLY AT THE END OF THIS SECTION.

A. CH 113-114 - CHEMISTRY

LARGEST NUMBER OF SECTIONS (32) OCCURS IN THE SPRING. ONE 25 STUDENT LABORATORY CAN SUPPORT 15 SECTIONS, 2 LABORATORIES, 30 SECTIONS. BY INCREASING LABORATORY CAPACITY TO 27, ONE AVOIDS THE ADDITION OF A THIRD LABORATORY FOR 2 SECTIONS.

IT IS NORMAL FOR CHEMISTRY LABORATORIES WITH FIXED STANDARD FURNITURE TO HOUSE ADEQUATELY 30 STUDENTS WITHIN 1,250 SQUARE FEET. FIGURES FOR THESE LABORATORIES ARE ESTABLISHED AT 1,200 SQUARE FEET FOR 27 STUDENTS. STORAGE AND PREPARATION SPACES ARE DETERMINED AT 500 SQUARE FEET EACH.

B. PH 111-112 - PHYSICS

THIS LABORATORY TIME IS THREE HOURS. 23 SECTIONS PER SEMESTER ARE CALLED FOR. THIS WOULD REQUIRE ONE 25 STUDENT LABORATORY (15 SECTIONS) AND ONE-HALF LABORATORY (8 SECTIONS). WE PROVIDE ONLY ONE LABORATORY SPACE (AT 50 SQUARE FEET PER STUDENT) INCREASING THE STUDENT POPULATION TO 40, WHICH IS FEASIBLE. STORAGE AND PREPARATION SPACE IS PROVIDED AT 500 SQUARE FEET.

C. ME 230-330

THIS LABORATORY TIME IS THREE HOURS. ACTUAL POPULATIONS CALL FOR 30 PLUS SECTIONS IN THE SPRING, WHICH MEANS THAT 2 LABORATORIES WILL HOUSE THE PROGRAM SETTING THE LABORATORY POPULATION AT 25. LABORATORY SIZE IS ESTABLISHED AT 80 SQUARE FEET PER STUDENT.

D. ME 380-381

TWO LABORATORIES ARE PROVIDED AT 2,000 SQUARE FEET FOR 25 STUDENTS EACH. LABORATORY TIME IS THREE HOURS.

E. TD 111-112 AND TD 380

LABORATORY TIME IS 4 HOURS FOR 111-112, 6 HOURS FOR 380.

TABULATIONS BY OPTIONS AND TECHNICIANS AT 2,000 STUDENTS RENDERS 30 SECTIONS PER SEMESTER. THERE ARE 16 SUMMER SECTIONS.

TD 380 SHOWS FIVE SECTIONS AT 6 HOURS PER EQUALS 30 HOURS LABORATORY TIME. TD 111-112 WITH THIRTY SECTIONS AT 4 HOURS PER EQUALS 120 LABORATORY HOURS, WITH A TOTAL REQUISITE OF 150 HOURS.

FOUR LABORATORIES ARE PROVIDED FOR THE THREE COURSES. SIZE OF LABORATORIES IS 1,750 SQUARE FEET FOR 25 STUDENTS EACH.

F. TM 161 AND WT 166

LABORATORY TIME 3 HOURS FOR TM 161, 4 HOURS FOR WT 166.

TM161 WOULD REQUIRE 40 SECTIONS IN THE FALL OF 3 HOURS PER LABORATORY, OR 120 HOURS.

WT 166 WOULD REQUIRE 40 SECTIONS IN THE SPRING. WE PROVIDE FOUR LABORATORIES AT 32 STUDENTS EACH TO ACCOMMODATE BOTH TM 161 AND WT 166. THE SHIFTING OF SOME EQUIPMENT EACH SEMESTER IS MORE FEASIBLE THAN USING THE LABORATORIES HALF TIME. BECAUSE OF THE HEAVY PROCESSES AND EQUIPMENT DIFFERENCES, FOOTAGE IS ESTABLISHED AS 3,750 SQUARE FEET (100 SQUARE FEET PER STUDENT) AND IS BASED ON THE 32 LABORATORY POPULATION FOR WT 166.

G. TE 200-300 AND TA 306

THIS LABORATORY TIME IS 3 HOURS. FROM THE TABULATIONS OF OPTIONS IT APPEARS THAT THE LARGEST POPULATION OCCURS IN THE FALL WITH 24 SECTIONS OF TE 200-300 AND 11 SECTIONS OF TA-306.

BY ESTABLISHING THE POPULATION OF TE 200-300 AT 30 (REDUCING SECTIONS TO 19) AND TA 306 AT 25 (WITH 11 SECTIONS) WE HOUSE THE 30 SECTIONS IN TWO LABORATORIES AT 1,500 SQUARE FEET EACH. FIFTY SQUARE FEET PER STUDENT IS NORMAL FOR THE PROCESSES IN THESE LABORATORIES.

H. TA 180-181

LABORATORY TIME IS 4 HOURS FOR OPTIONS 1, 2, AND 3, AND 15 HOURS FOR MAINTENANCE TECHNICIANS.

38 SECTIONS OCCUR EACH SEMESTER. 16 ARE AT 15 HOURS LABORATORY TIME AND 22 ARE AT 4. THIS TOTALS 240 + 88 = 328 HOURS LABORATORY TIME.

BY ESTABLISHING A TEN HOUR SCHEDULE WE PROVIDE 50 HOURS OF TIME PER LABORATORY. THIS WOULD CALL FOR 6-1/2 LABORATORIES AT 2, 500 SQUARE FEET FOR 25 STUDENTS EACH.

HOWEVER, BY INCREASING THE POPULATION OF THE MAINTENANCE TECHNICIAN LABORATORIES TO 30 WE ELIMINATE THE HALF LABORATORY AND PROVIDE SIX LABORATORIES AT 2, 500 SQUARE FEET.

THREE COMMON STORAGE AREAS OF 1, 250 SQUARE FEET FOR A TOTAL OF 3, 750 SQUARE FEET OF STORAGE ARE PROVIDED.

I. TA 287-288

POPULATIONS FOR BOTH LABORATORIES ARE ESTABLISHED AT 30, AS PER THE EDUCATIONAL FACILITIES SPECIFICATIONS. THIS PRODUCES 6 SECTIONS OF MAINTENANCE TECHNICIANS AT 15 HOURS PER, OR 90 HOURS; AND 14 SECTIONS OF OPTIONS AT 4 HOURS PER OR 50 HOURS, FOR A TOTAL OF 146 HOURS.

A TEN HOUR SCHEDULE APPLIED TO THIS LABORATORY PRODUCES A 50 HOUR LABORATORY - FOUR OF WHICH ARE PROVIDED TO SUPPORT THE REQUIRED POPULATION.

LABORATORIES ARE SET AT 3, 750 SQUARE FEET.

ONE ENGINE TEST LABORATORY PER LARGE LABORATORY IS PROVIDED.

J. EE 226

THIS LABORATORY TIME IS 2 HOURS. THIS LABORATORY IS SCHEDULED FOR EIGHT 25-STUDENT SECTIONS FALL AND 11 SECTIONS SPRING.

WE PROVIDE ONE LABORATORY AT 1,200 SQUARE FEET AND ONE STORAGE AT 300 SQUARE FEET.

K. TA 301

ONE LABORATORY AT 1,800 SQUARE FEET IS PROVIDED, A 600 SQUARE FOOT WIND TUNNEL AND 500 SQUARE FEET OF STORAGE.

L. TA 308-388

ONE LABORATORY A 1,250 SQUARE FEET FOR 25 STUDENTS IS PROVIDED AND ONE GAS TURBINE LABORATORY AT 650 SQUARE FEET.

M. TA 383-309-311-182-382-387 (SIM) - 185 (SIM)

EDUCATIONAL FACILITIES SPECIFICATIONS CALL FOR VARIOUS SIMULATORS AND MOCK UPS.

SPACE FOR THESE IS DESIGNATED AT 2,400 SQUARE FEET FOR FOUR SIMULATORS AT 600 SQUARE FEET EACH. LABORATORY-LECTURE SPACE IS PROVIDED AT 1,600 SQUARE FEET FOR 40 STUDENTS.

RELATIONSHIPS:

LABORATORIES CLUSTER BETWEEN CR UNITS AND INDUSTRIAL AND MAINTENANCE AREAS ALONG THE N.E. - S.W. RUNWAY.

1) CH 113-114, PH 111-112, ME 230-330 FORM A CLUSTER.

2) TD 111-112, TD 380 FORM A CLUSTER.

3) TM 161, WT 166 FORM A CLUSTER.

4) TE 200-300, TA 306 FORM A CLUSTER.

5) TA 308-388 FORM A CLUSTER.

6) TA 383, 309, 311, 182, 382, 387, 185 FORM A CLUSTER.

7) TA 301, TA 180-181, TA 287-288 ARE LOCATED ON THE GROUND FLOOR NEAR THE RUNWAY AND MAINTENANCE SHOPS.

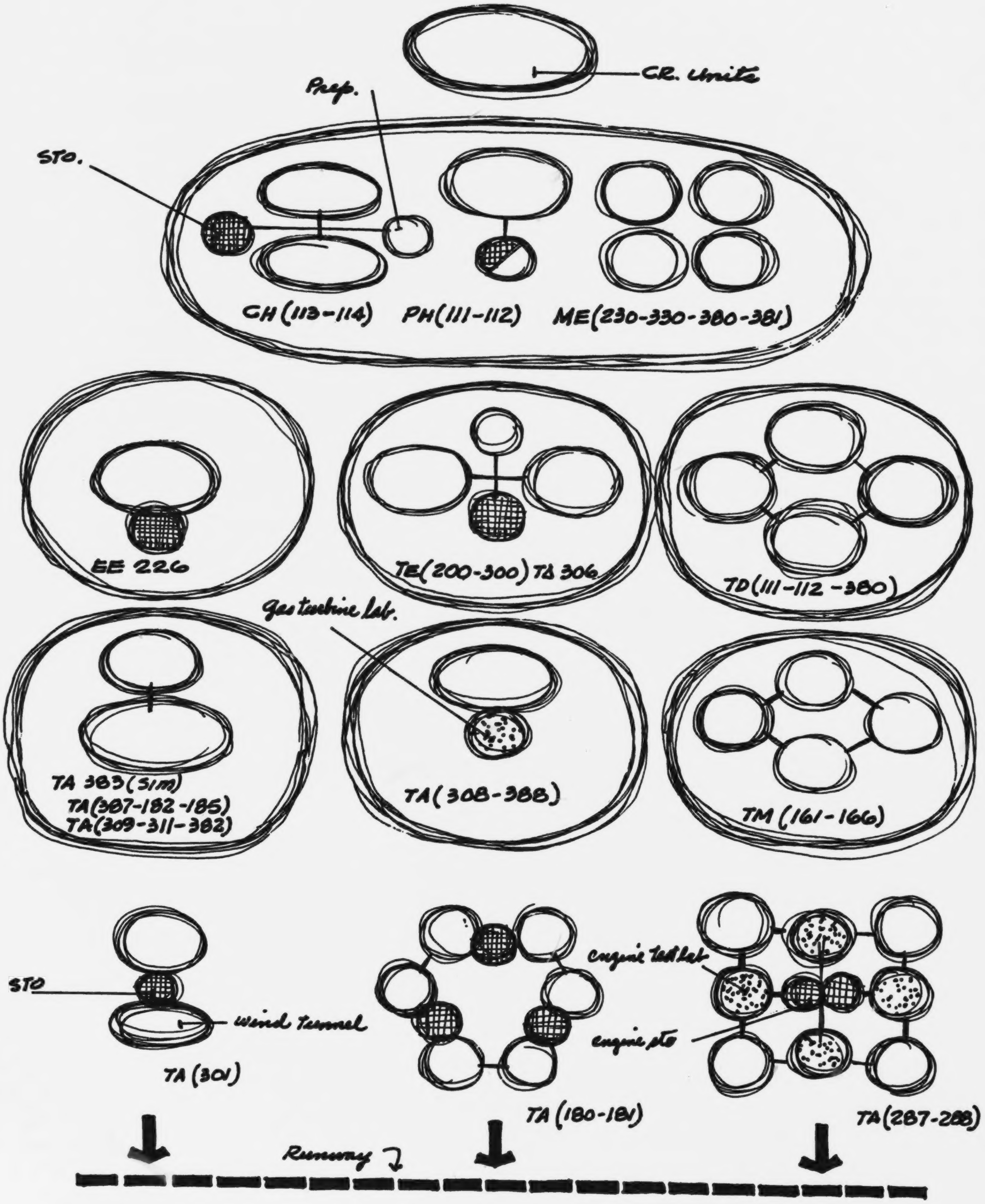
8) CH 113-114, PH 111-112, ME 230, ME 330 ME 380, ME 381 ARE LIGHT PROCESSES LABORATORIES AND ARE IDENTIFIED WITH AND LOCATED MOST CLOSELY TO THE CLASSROOM UNITS AND LIBRARY.

9) THE REST FORM A MEDIUM PROCESSES AREA BETWEEN THESE LABORATORIES AND THOSE ORIENTED NEAR THE RUNWAY; HOWEVER, EE 226, TE 200, TE 300, TE 306, TD 111-112, AND TD 380 ARE LOCATED CLOSER TO THE CR UNITS THAN ARE TA 308, TA 388, TA 383, TA 309-311, TA 382, TA 387, TA 182, TA 185, AND TM 161-166, WHICH ARE LOCATED NEARER THOSE LABORATORIES WHICH FRONT ALONG THE RUNWAY.

RECOMMENDED TALLY ON LABORATORIES

1.	CH 113-114	= 2 LABORATORIES AT 1200	= 2,400
		+ STORAGE AT 500	= 500
		+ PREPARATION AT 500	= 500
2.	PH 111-112	= 1 LABORATORY (40 STUDENTS) AT 2,000	= 2,000
		+ STORAGE & PREPARATION AT 500	= 500
3.	ME 230-330	= 2 LABORATORIES AT 2,000	= 4,000
4.	ME 380-381	= 2 LABORATORIES AT 2,000	= 4,000
5.	TD 111-112 & TD 380	= 4 LABORATORIES AT 1,750	= 7,000
6.	TM 161 & WT 166	= 4 LABORATORIES AT 3,600	= 14,400
7.	TE 200-300 & TA 306	= 2 LABORATORIES AT 1,500	= 3,000
		+ 600 STORAGE	= 600
		+ 600 STORAGE	= 600
8.	TA 180-181	= 6 LABORATORIES AT 2,500	= 15,000
		3 COMMON STORAGE AT 1,250	= 3,750
9.	TA 287-288	= 4 LABORATORIES AT 3,750	= 15,000
		+ 1 ENGINE STORAGE AT 3,600	= 3,600
		+ 4 ENGINE TEST LABORATORIES AT 600	= 2,400
		+ ENGINE STORAGE (TECH)	= 3,240
10.	EE 226	= 1 LABORATORY AT 1,200	= 1,200
		+ 1 STORAGE AT 300	= 300
11.	TA 301	= 1 LABORATORY AT 1,800	= 1,800
		1 WIND TUNNEL AT 600	= 600
		1 STORAGE AT 500	= 500
12.	TA 308 & TA 388	= 1 LABORATORY AT 1,250	= 1,250
		1 GAS TURBINE LABORATORY AT 650	= 650
13.	TA 383	= 1 SIMULATOR LABORATORY AT 2,400	= 2,400
14.	TA 309 & TA 311, 182, 382, 387 (SIM), 185 (SIM)	= 1 LECTURE LABORATORY AT 1,600	= 1,600
			92,790

LABORATORIES



CR. Units
Prep.
STO.
CH(113-114)
PH(111-112)
ME(230-330-380-381)
EE 226
TE(200-300) TA 306
TD(111-112-380)
Gas turbine lab.
TA 383(SIM)
TA(387-182-185)
TA(309-311-382)
TA(308-388)
TM(161-166)
STO
wind tunnel
TA(301)
engine test lab
engine sto
TA(180-181)
TA(287-288)
Runway

III. LIBRARY

SQUARE FOOTAGE ALLOCATIONS FOR LIBRARY SPACE VARY FROM STATE TO STATE AND FROM YEAR TO YEAR. CURRENT AMERICAN LIBRARY ASSOCIATION STANDARDS SUGGEST 35 SQUARE FEET PER STUDENT BASED ON 10 PERCENT OF STUDENT ENROLLMENT. THIS FIGURE REPRESENTS STUDENT-ORIENTED SPACE TO BE AUGMENTED BY SERVICE AREAS, AUTOMATED AREAS, AND SPECIAL AREAS AS REQUIRED.

SPACE BREAKDOWN:

1. MAIN READING ROOM, CONFERENCE ROOMS, CARRELS, TYPING CUES, ETC. (10% OF 2,000 x 35 SQ. FT.	7,000
2. SPECIAL RESEARCH AREA FOR LARGE AIRCRAFT MANUALS	700
3. LIBRARIAN'S OFFICE	100
4. LIBRARIAN'S WORK ROOM	300
5. MAGAZINE STORAGE	150
6. INSTRUCTOR'S WORK AREA (A.V. MATERIALS PRODUCTION)	900
7. MICROFILMING, MICROFISCHE	400
TOTAL	9,550

THE LIBRARY IS LOCATED CONTINGENT TO THE CR UNITS AND BETWEEN THEM AND THE PROPOSED FUTURE INDUSTRIAL RESEARCH AND DEVELOPMENT SECTION. LINKAGE WITH THIS LATTER SECTION WILL BE PERFORMED BY THE BASIC RESEARCH AND DEVELOPMENT UNIT.

IV. RESEARCH AND DEVELOPMENT (50 PEOPLE)

		AREA
TAPE STORAGE AND CONTROL CENTER		750 SQ. FT.
T V PRODUCTION AND STORAGE AREA		1200 SQ. FT.
TEACHING MATERIAL PRODUCTION (LIVE, CARRELS, WORK SPACE, COUNTER, SINKS, ETC.)		750 SQ. FT.
DARK ROOM AND CAMERA AREA		400 SQ. FT.
3 CONFERENCE AREAS @ 300 SQ. FT.		900 SQ. FT.
MEDICAL CENTER		
RECEPTION	-300 SQ. FT.	
EXAM (2 @ 150)	-300 SQ. FT.	
LAB	-500 SQ. FT.	
OFFICES (2 @ 100)	-200 SQ. FT.	
STORAGE	-100 SQ. FT.	
BED AREA	-300 SQ. FT.	
		1700 SQ. FT.
COMPUTER AREA		
MAIN ROOM	-750 SQ. FT.	
SUPPORT DATA PROCESS	-750 SQ. FT.	
CONTROL OFFICE & LIBRARY (@ 150)	-300 SQ. FT.	
STORAGE	-150 SQ. FT.	
		1950 SQ. FT.
CIRCULATION, ETC.		2350 SQ. FT.
TOTAL		10000 SQ. FT.

V. ADMINISTRATION

ADMINISTRATIVE OFFICES - REGISTRATION	7500 SQ. FT.
SPACE ALLOCATION FOR INDUSTRY RESEARCH & DEVELOPMENT (APPROX. 300 PEOPLE)	110000 SQ. FT.

C. FACILITIES BREAKDOWN

INTRODUCTION

THE SPECIFIC FACILITIES REQUIREMENTS WERE DETERMINED BY UTILIZING THE DATA DEVELOPED IN THE PREVIOUS SECTION AS A POINT OF DEPARTURE AND BY CORRELATING THE REQUIREMENTS GENERATED BY THE EDUCATIONAL OBJECTIVES, POPULATION CHARACTERITSTICS, FACULTY AND STAFF, RESEARCH AND DEVELOPMENT, AND THE EDUCATIONAL INNOVATIONS ANTICIPATED FOR THE FUTURE.

A NUMBER OF CONFERENCES WERE HELD WITH THE ARCHITECTS AND THE EDUCATIONAL CONSULTANTS, RESULTING IN SIGNIFICANT REDUCTIONS IN THE ORIGINAL SPACE REQUIREMENTS THROUGH IMPROVED SCHEDULING, SPACE UTILIZATION, STUDENT GROUPING, THE INCREASED USE OF EXISTING MULTI-MEDIA EQUIPMENT, AND ALSO BY THE COMBINATION OF SEVERAL LABORATORIES.

THE FACILITIES BREAKDOWN, WHICH IS PRESENTED ON THE FOLLOWING PAGES, REFLECTS A POD ARRANGEMENT FOR A TOTAL CAPACITY OF 2,000 STUDENTS, FURTHER BROKEN DOWN IN TWO CONSTRUCTION PHASES OF 1,000 STUDENTS EACH. THE ARRANGEMENT OF THE FACILITIES ON THE SITE IS SUCH THAT FOUR PODS COULD EVENTUALLY BE CONSTRUCTED TO ACCOMMODATE 8,000 STUDENTS, IF REQUIRED.

LAND USE - ACREAGE

BUILDINGS	10 ACRES
UTILITIES - MAINTENANCE/STORAGE	1 ACRE
MAJOR CIRCULATION	5 ACRES
PARKING	16 ACRES
LANDSCAPING	47 ACRES
PHYSICAL EDUCATION/RECREATION	18 ACRES
UNUSED	97 ACRES
TOTAL	194 ACRES

ATHLETIC FACILITIES

TENNIS COURTS (6)	1.0 ACRE
BASKETBALL/VOLLEYBALL (4)	0.6 ACRE
SOCCER/TOUCH FOOTBALL	1.8 ACRES
BASEBALL	2.8 ACRES
SOFTBALL	1.8 ACRES
HANDBALL	---
SWIMMING POOL (42 FEET x 75 FEET)	---
GOLF - PITCH/PUTT COURSE	10.0 ACRES
TOTAL	18.0 ACRES

SUMMARY

TOTAL FACILITIES

	SQUARE FOOTAGE		
	NET	GROSS	PERCENT
INSTRUCTIONAL/FACULTY	118,850	167,850	22.1
LIBRARY/RESEARCH & DEVELOPMENT	19,550	27,500	3.6
ADMINISTRATION	8,000	11,100	1.5
PHYSICAL EDUCATION	15,000	20,000	2.6
STUDENT CENTER	8,000	10,900	1.4
UTILITIES-CENTRAL PLANT	2,500	2,750	0.4
MECHANICAL & ELECTRICAL ROOMS	11,840	15,490	2.0
MAINTENANCE, STORAGE/RECEIVING	5,000	5,500	0.7
TOILETS	4,140	5,400	0.7
FLIGHT TRAINING	31,350	36,350	4.8
AUXILIARY	4,900	6,610	0.9
	229,130	309,500	40.7
CIRCULATION, WALLS, ETC. (35%)	80,370		
TOTAL	309,500	309,500	40.7
RESIDENCE	450,000	450,000	59.3
GRAND TOTAL	759,500	759,500	100.0

FACILITIES BREAKDOWN - TOTAL

I. ACADEMIC:

	AREA	
1. CLASSROOM - CONFERENCE TEACHER SPACE	21,700 SQ. FT.	
A. SECRETARIAL SPACE	1,000	
2. LABORATORIES	92,790	
A. FACULTY OFFICES	3,000	
B. SECRETARIAL SPACE	360	
3. LIBRARY	9,550	
4. BASIC RESEARCH/DEVELOPMENT	10,000	
	138,400	
TOILETS	2,800	
MECHANICAL & ELECTRICAL ROOM	5,700	
NET AREA	146,900	
CIRCULATION, WALLS, ETC.	59,500	
TOTAL GROSS AREA		206,400 SQ. FT.

II. ADMINISTRATIVE:

1. OFFICES, REGISTRATION, ETC.	8,000 SQ. FT.	
TOILETS	220	
MECHANICAL & ELECTRICAL ROOM	400	
NET AREA	8,620	
CIRCULATION, WALLS, ETC.	3,330	
TOTAL GROSS AREA		11,950 SQ. FT.

III. RECREATIONAL:

1. STUDENT UNION	8,000 SQ. FT.	
2. GYMNASIUM	15,000	
TOILETS	660	
MECHANICAL & ELECTRICAL ROOM	1,140	
NET AREA	24,800	
CIRCULATION, WALLS, ETC.	8,540	
TOTAL GROSS AREA		33,340 SQ. FT.

IV. AUXILIARY:	AREA	
1. UTILITIES (CENTRAL PLANT)	2,500 SQ. FT.	
2. MAINTENANCE, STORAGE/RECEIVING	5,000	
3. POST OFFICE	800	
4. INFIRMARY	2,500	
5. CHAPEL	600	
6. CAMPUS SECURITY	1,000	
TOILETS	460	
MECHANICAL & ELECTRICAL ROOM	400	
TRANSFORMER VAULTS	2,700	
SWITCH GEAR	1,500	
NET AREA	17,460	
CIRCULATION, WALLS, ETC.	4,000	
TOTAL GROSS AREA		21,460 SQ. FT.

V. FLIGHT TRAINING:		
1. OPERATIONS BUILDING	9,000 SQ. FT.	
2. HANGARS	20,800	
3. CONTROL TOWER	400	
TOILETS	650	
MECHANICAL & ELECTRICAL ROOM	500	
NET AREA	31,350	
CIRCULATION, WALLS, ETC.	5,000	
TOTAL GROSS AREA		36,350 SQ. FT.
SUB TOTAL		309,500 SQ. FT.

VI. RESIDENCE:	
1. STUDENTS	450,000 SQ. FT.
GRAND TOTAL	759,500 SQ. FT.

FACILITIES BREAKDOWN - PHASING

PHASE I - TO BE COMPLETED SEPTEMBER 1, 1969

I. FLIGHT TRAINING CENTER:	AREA	
1. OPERATIONS BUILDING	9,000 SQ. FT.	
2. HANGARS	20,800	
3. CONTROL TOWER	400	
TOILETS	650	
MECHANICAL & ELECTRICAL ROOM	500	
NET AREA	31,350	
CIRCULATION, WALLS, ETC.	5,000	
TOTAL GROSS AREA		36,350 SQ. FT.

II. AUXILIARY:		
1. TRANSFORMER VAULT NO. 1	900 SQ. FT.	
2. SWITCHGEAR ROOM NO. 1	500	
NET AREA	1,400	
WALLS	100	
TOTAL GROSS AREA		1,500 SQ. FT.
PHASE I - TOTAL GROSS AREA		37,850 SQ. FT.

PHASE II (1,000 STUDENTS) - TO BE COMPLETED SEPTEMBER 1, 1970

I. ACADEMIC:

		AREA	
1.	CLASSROOM-CONFERENCE TEACHER SPACE	10,500 SQ. FT.	
	A. SECRETARIAL SPACE	500	
2.	LABORATORIES	79,000	
	A. FACULTY OFFICES	1,500	
	B. SECRETARIAL SPACE	180	
3.	LIBRARY	9,550	
4.	BASIC RESARCH/DEVELOPMENT	10,000 (COMPUTER CENTER INCLUDED)	
		111,230	
	TOILETS	2,200	
	MECHANICAL & ELECTRICAL ROOM	4,500	
	NET AREA	117,930	
	CIRCULATION, WALLS, ETC.	46,470	
	TOTAL GROSS AREA		164,400 SQ. FT.

II. ADMINSTRATIVE:

		AREA	
1.	OFFICES - REGISTRATION	5,000 SQ. FT.	
	TOILETS	120	
	MECHANICAL & ELECTRICAL ROOM	250	
	NET AREA	5,370	
	CIRCULATION, WALLS, ETC.	2,130	
	TOTAL GROSS AREA		7,500 SQ. FT.

III. RECREATIONAL:

		AREA	
1.	STUDENT CENTER	4,000 SQ. FT.	
	TOILETS	220	
	MECHANICAL & ELECTRICAL ROOM	210	
	NET AREA	4,430	
	CIRCULATION, WALLS, ETC.	1,540	
	TOTAL GROSS AREA		5,970 SQ. FT.

IV. AUXILIARY:

		AREA	
1.	UTILITIES (CENTRAL PLANT)	2,000 SQ. FT.	
2.	MAINTENANCE, STORAGE/RECEIVING	2,000	
3.	POST OFFICE - MAIL ROOM	800	
4.	INFIRMARY	1,000	
5.	CHAPEL	300	
6.	CAMPUS SECURITY	1,000	
	TRANSFORMER VAULT NO. 2 & 3	1,800	
	SWITCH GEAR NO. 2 & 3	1,000	
		9,900	
	TOILETS	460	
	MECHANICAL & ELECTRICAL ROOM	300	
	NET AREA	10,660	
	CIRCULATION, WALLS, ETC.	2,300	
	TOTAL GROSS AREA		12,960 SQ. FT.
	TOTAL ACADEMIC		190,830 SQ. FT.

V. RESIDENCE:

1.	STUDENTS	225,000 SQ. FT.
	TOTAL BUILT IN PHASE II	415,830 SQ. FT.
	TOTAL BUILT IN PHASE I	37,850 SQ. FT.
	GRAND TOTAL PHASES I & II	453,680 SQ. FT.

PHASE III (2,000 STUDENTS) - TO BE COMPLETED SEPTEMBER 1, 1972

I. ACADEMIC:

		AREA	
1.	CLASSROOM-CONFERENCE TEACHER SPACE	11,200 SQ. FT.	
	A. SECRETARIAL SPACE	500	
2.	LABORATORIES	13,790	
	A. FACULTY OFFICES	1,500	
	B. SECRETARIAL SPACE	180	
		27,170	
	TOILETS	600	
	MECHANICAL & ELECTRICAL ROOM	1,200	
	NET AREA	28,970	
	CIRCULATION, WALLS, ETC.	13,030	
	TOTAL GROSS AREA		42,000 SQ. FT.

II. ADMINISTRATIVE:

1.	OFFICES, REGISTRATION, ETC.	3,000 SQ. FT.	
	TOILETS	100	
	MECHANICAL & ELECTRICAL ROOM	150	
	NET AREA	3,250	
	CIRCULATION, WALLS, ETC.	1,200	
	TOTAL GROSS AREA		4,450 SQ. FT.

III. RECREATIONAL:

1.	STUDENT UNION	4,000 SQ. FT.	
2.	GYMNASIUM	15,000	
	TOILETS	440	
	MECHANICAL & ELECTRICAL ROOM	930	
	NET AREA	20,370	
	CIRCULATION, WALLS, ETC.	7,000	
	TOTAL GROSS AREA		27,370 SQ. FT.

IV. AUXILIARY

		AREA	
1.	UTILITIES (CENTRAL PLANT)	500 SQ. FT.	
2.	MAINTENANCE, STORAGE/RECEIVING	3,000	
3.	INFIRMARY	1,500	
4.	CHAPEL	300	
	MECHANICAL & ELECTRICAL ROOM	100	
	NET AREA	5,400	
	CIRCULATION, WALLS, ETC.	1,600	
	TOTAL GROSS AREA		7,000 SQ. FT.
	TOTAL ACADEMIC		80,820 SQ. FT.

V. RESIDENCE:

1.	STUDENTS	225,000 SQ. FT.
	TOTAL BUILT IN PHASE III	305,820 SQ. FT.
	TOTAL BUILT IN PHASES I & II	453,680 SQ. FT.
	GRAND TOTAL PHASES I, II, & III	759,500 SQ. FT.

D. BUDGET ANALYSIS

PHASE I

FLIGHT TRAINING CENTER

A.	BUILDINGS	37,850 SQ. FT. @ $18.00 =	$ 681,300.00
B.	SITE WORK - SURFACE ITEMS		
	SITE PREPARATION	5,500.00	
	ROADS	30,310.00	
	PARKING	3,970.00	
	LANDSCAPING	40,000.00	
			79,780.00
C.	SITE WORK - UTILITIES		
	WATER DISTRIBUTION	47,110.00	
	WATER TANK AND WELL	125,100.00	
	SEWER	7,830.00	
	GAS	1,760.00	
	AIR CONDITIONING	5,800.00	
	POWER AND COMMUNICATION		
	PRIMARY LINES	50,400.00	
	SECONDARY LINES	5,000.00	
	LIGHTING - ROADS	28,700.00	
	LIGHTING - PARKING	2,000.00	
			273,700.00
	SUB TOTAL		$ 1,034,780.00
	CONSTRUCTION CONTINGENCY - 1%		10,350.00
	PROFESSIONAL FEES AND ADMINISTRATION - 7%		72,430.00
	TOTAL		$ 1,117,560.00
	EQUIPMENT		1,282,500.00
	GRAND TOTAL		$ 2,400,060.00

PHASE II

A. ACADEMIC CENTER

CR/LABS/LIBRARY	164,400 SQ. FT. @ $23.50 =	$ 3,863,400.00	
ADMINISTRATION	7,500 SQ. FT. @ $20.00 =	$ 150,000.00	
RECREATIONAL	5,970 SQ. FT. @ $20.00 =	$ 119,400.00	
AUXILIARY	12,960 SQ. FT. @ $18.00 =	$ 233,280.00	
			$4,366,080.00

B. RESIDENCE

BUILDING	225,000 SQ. FT. @ $20.00 =	$4,500,000.00

TOTAL COST BUILDINGS - PHASE II $8,866,080.00

C. SITE WORK - SURFACE ITEMS

SITE PREPARATION	8,400.00	
ROADS	46,500.00	
PARKING AREA	68,700.00	
TERRACES & PLAZAS	249,340.00	
RETAINING WALL	30,000.00	
LAKE	15,150.00	
LANDSCAPING	60,000.00	
		478,090.00

D. SITE WORK - UTILITIES

WATER DISTRIBUTION	117,780.00	
SEWER	19,580.00	
GAS	4,410.00	
AIR CONDITIONING	100,800.00	
UTILITIES TUNNEL	50,400.00	
POWER AND COMMUNICATIONS		
PRIMARY LINES	36,000.00	
SECONDARY LINES	55,000.00	
LIGHTING - ROADS	25,700.00	
LIGHTING - PARKING	33,800.00	
		443,470.00

SUB TOTAL $9,787,640.00

CONSTRUCTION CONTINGENCY - 1%		$ 97,870.00
PROFESSIONAL FEES AND ADMINISTRATION - 7%		685,130.00
TOTAL		$10,570,640.00
E. EQUIPMENT		
ACADEMIC FACILITIES	750,000.00	
RESIDENTIAL	300,000.00	
		1,050,000.00
GRAND TOTAL		$11,620,640.00

PHASE III

A. ACADEMIC CENTER

CR/LABS/LIBRARY	42,000 SQ. FT. @ $23.50 = $987,000.00	
ADMINISTRATION	4,450 SQ. FT. @ $20.00 = $ 89,000.00	
RECREATIONAL	27,370 SQ. FT. @ $20.00 = $547,400.00	
AUXILIARY	7,000 SQ. FT. @ $18.00 = $126,000.00	
		$ 1,749,400.00

B. RESIDENCE

BUILDING	225,000 SQ. FT. @ $20.00 =	$ 4,500,000.00
TOTAL COST BUILDINGS - PHASE III		$ 6,249,400.00

C. SITE WORK - SURFACE ITEMS

SITE PREPARATION	5,100.00	
ROADS	28,400.00	
PARKING AREAS	59,600.00	
LANDSCAPING	36,000.00	
		$ 129,100.00

D. SITE WORK - UTILITIES

WATER DISTRIBUTION	70,660.00	
SEWER	11,750.00	
GAS	2,650.00	
AIR CONDITIONING	87,330.00	
POWER AND COMMUNICATIONS		
PRIMARY LINES	3,600.00	
SECONDARY LINES	40,000.00	
LIGHTING - ROADS	44,600.00	
LIGHTING - PARKING	29,300.00	
		289,890.00
SUB TOTAL		$ 6,668,390.00
CONSTRUCTION CONTINGENCY - 1%		66,680.00
PROFESSIONAL FEES AND ADMINISTRATION - 7%		466,790.00
TOTAL		$ 7,201,860.00

E. EQUIPMENT

ACADEMIC FACILITIES	250,000.00	
RESIDENTIAL	300,000.00	
		$ 550,000.00
GRAND TOTAL		$ 7,751,860.00

TOTAL FACILITIES

PHASE I	$ 2,400,060.00
PHASE II	$11,620,640.00
PHASE III	$ 7,751,860.00
	$21,772,560.00

INCLUDING SITE DEVELOPMENT, BUILDINGS, EQUIPMENT, CONTINGENCY AND PROFESSIONAL FEES.

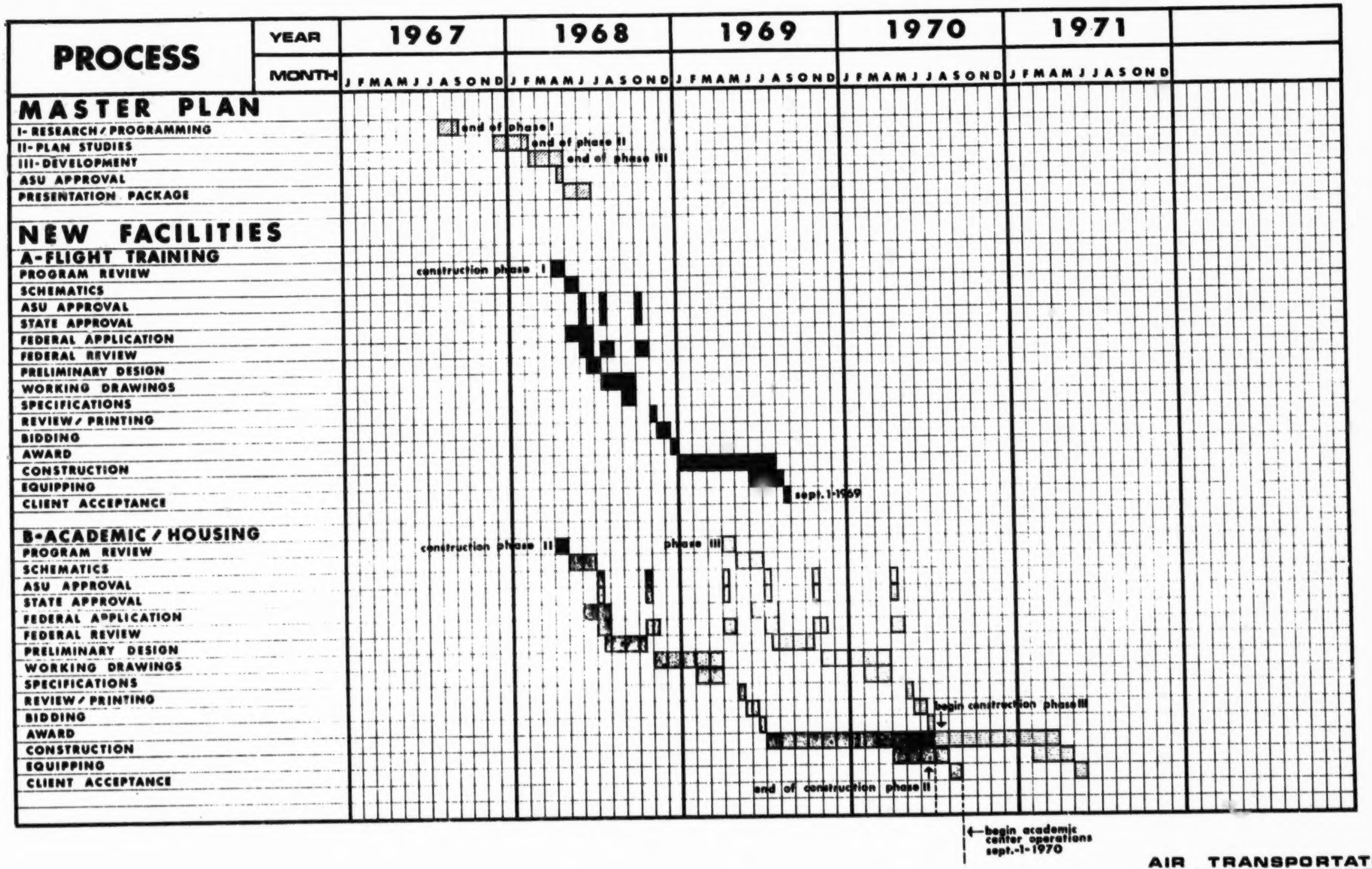
COST PER STUDENT: $ 10,886.28

SQUARE FOOTAGE PER STUDENT:

ACADEMIC:	154.75 SQ. FT./STUDENT
DORMITORIES:	300.00 SQ. FT./STUDENT

E. PLANNING AND CONSTRUCTION SCHEDULE

THIS BAR CHART REPRESENTS A COMPREHENSIVE SCHEDULE FOR THE DEVELOPMENT OF THE CAMPUS PLAN AND THE PROCESS OF CONSTRUCTION. IT ILLUSTRATES THE INTERDEPENDENCY OF PLANNING AND BUILDING ACTIONS AND THEIR RELATIONS TO A TIME TABLE. THIS SCHEDULE DEALS WITH THE THREE PROPOSED PHASES OF CONSTRUCTION AND IS SUFFICIENTLY FLEXIBLE TO BE ADAPTED TO FUTURE REQUIREMENTS.



AIR TRANSPORTATION TRAINING CENTER
ARIZONA STATE UNIVERSITY

PANCOAST/FERENDINO/GRAFTON/ARCHITECTS
MIAMI FLORIDA
CHOPAS AND STARKOVICH ARCHITECTS
PHOENIX ARIZONA

PLANNING AND CONSTRUCTION SCHEDULE

IV. SITE DEVELOPMENT

INTRODUCTION

THE GOODYEAR AUXILIARY AIRFIELD LOCATED ON THE GILA RIVER INDIAN RESERVATION WAS SELECTED AS THE SITE FOR THE PROPOSED AIR TRANSPORTATION TRAINING CENTER DURING THE FEASIBILITY STUDY. THE SELECTION OF THIS SITE WAS BASED ON THE POTENTIAL ECONOMIC IMPACT ON THE GILA RIVER INDIAN RESERVATION AND SURROUNDING COMMUNITIES, AIR SPACE CONSIDERATIONS, ACCESSIBILITY, AND PROXIMITY TO ARIZONA STATE UNIVERSITY.

THE TOTAL COMPLEX WILL BE LOCATED AS AN INTEGRAL UNIT ON THE 1,349 ACRES COMPRISING THE GOODYEAR AUXILIARY AIRFIELD, WITH THE TRAINING CENTER LOCATED ON APPROXIMATELY 200 ACRES OF THE AIRFIELD. ORIGINALLY, IT HAD BEEN PLANNED TO USE TWO SITES -- AN ACADEMIC COMPLEX AND A FLIGHT TRAINING COMPLEX. HOWEVER, THE PROBLEMS ASSOCIATED WITH AND THE COSTS FOR TRANSPORTATION BETWEEN THE SITES, ALONG WITH THE INORDINATE LOSS OF STUDENT TIME, STRONGLY FAVORED THE LOCATION OF THE TOTAL COMPLEX AT A SINGLE SITE.

ANOTHER IMPORTANT FACTOR IN THIS DECISION WAS MOTIVATION. THE SINGLE SITE PROVIDES FOR CLOSE VISUAL CONTACT WITH "LIVE" AVIATION AND IS CONSIDERED A SIGNIFICANT FACTOR FOR MOTIVATION OF THE AVIATION STUDENTS. FURTHER, THE OVERALL COST FOR CONSTRUCTION AND OPERATION OF THE COMPLEX WILL BE CONSIDERABLY LESS ON THE SINGLE SITE.

AFTER THE DECISION WAS MADE TO LOCATE THE ENTIRE AVIATION COMPLEX AT A SINGLE SITE, DETAILED STUDIES WERE THEN MADE, INCLUDING SOIL ANALYSIS, ELECTRICAL, COMMUNICATION, AND MECHANICAL SYSTEMS. REPORTS OF THESE STUDIES ARE INCLUDED IN THE FOLLOWING SUB-SECTIONS.

A. SOIL ANALYSIS AND ENGINEERING REPORT

AIR TRANSPORTATION TRAINING CENTER
ARIZONA STATE UNIVERSITY
SOIL INVESTIGATION

SCOPE

THIS REPORT PRESENTS THE RESULTS OF A PRELIMINARY SOIL INVESTIGATION FOR THE PROPOSED ARIZONA STATE UNIVERSITY AIR TRANSPORTATION TRAINING CENTER LOCATED SOUTHWEST OF CHANDLER, ARIZONA. THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE PHYSICAL CHARACTERISTICS OF THE SUBSOILS WITHIN THE GENERAL AREAS OF CONSTRUCTION FOR USE IN THE INITIAL ARCHITECTURAL PLANNING CONCEPTS AND TO AID IN ARRIVING AT THE MOST ECONOMICAL FOUNDATION SYSTEMS.

INVESTIGATION

EIGHT TEST BORINGS WERE DRILLED USING A ROTARY AUGER (PENNDRILL) DRILLING RIG AT THE LOCATIONS SHOWN ON THE ACCOMPANYING SITE PLAN. DURING THE TEST DRILLING, THE SOILS ENCOUNTERED WERE CONTINUOUSLY EXAMINED, VISUALLY CLASSIFIED AND WHEREVER APPLICABLE, SAMPLED.

FIELD PENETRATION TESTS WERE MADE AT THE BORING LOCATIONS FOR A GUIDE TO THE RELATIVE IN-SITU DENSITY OF THE SUBSOIL. THE PENETRATION RESISTANCE OF THE SUBSOIL WAS MEASURED IN ACCORDANCE WITH STANDARD PENETRATION TEST PROCEDURES (ASTM: D1586), OR BY MEASURING PENETRATION OF A 2.0 INCH DIAMETER BULL NOSE TYPE PENETROMETER DRIVEN WITH THE STANDARD 30 INCH FREE-FALL DROP HAMMER WEIGHING 140 POUNDS.

AN UNDISTURBED SAMPLE WAS TAKEN FROM A DEPTH OF 2.0 FEET AT BORING LOCATION 7 WHERE THE LOWEST PENETRATION RESISTANCE WAS MEASURED AT SHALLOW FOOTING DEPTHS. LABORATORY CONSOLIDATION TESTING WAS PERFORMED TO ESTIMATE COMPRESSIBILITY FOR SHALLOW FOOTING ANALYSIS. THE CONSOLIDATION TEST WAS PERFORMED USING A CASAGRANDE FIXED RING TYPE CONSOLIDOMETER WITH THE SAMPLE TESTED UNDER IN-SITU MOISTURE CONDITIONS. AFTER CONSOLIDATION

TO A PRESSURE OF 1.1 TONS PER SQUARE FOOT HAD BEEN COMPLETED, THE SAMPLE WAS SUBMERGED TO SHOW THE EFFECT OF SATURATION.

TWO SURFACE GRAB SAMPLES REPRESENTATIVE OF THE EXTREME SOIL TYPES ENCOUNTERED WERE SUBJECTED TO GRADATION AND ATTERBERG LIMITS TESTS TO AID THE PRELIMINARY DESIGN OF SLAB-ON-GRADE CONSTRUCTION AND PAVEMENT SECTIONS. THE SURFACE SAMPLES WERE ALSO ANALYZED TO DETERMINE ALKALINITY AND SOLUBLE SALT CONTENT FOR AGRICULTURAL PURPOSES, AND FOR A GUIDE TO THEIR CORROSIVE POTENTIAL ON FOUNDATION CONCRETE AND BELOW GRADE PLUMBING.

SITE AND SOIL CONDITIONS

THE SITE IS UNDEVELOPED DESERT LAND EXCEPT FOR THAT PORTION WHICH IS PAVED FOR RUNWAY AND TAXIWAY AREAS. THE DESERT LAND IS ESSENTIALLY LEVEL AND IS COVERED WITH LIGHT DESERT GROWTH SO THAT RELATIVELY LIGHT SURFACE GRADING WILL BE REQUIRED. THE GROUND SURFACE WAS FIRM PRESENTING NO MOBILIZATION PROBLEMS FOR THE DRILLING RIG, AND SHOULD PRESENT NO MOBILIZATION PROBLEMS FOR CONSTRUCTION EQUIPMENT UNLESS THE SURFACE SOILS WERE TO BECOME WET.

AS DISCLOSED BY THE TEST BORINGS, THE SUBSOIL STRATIFICATION ACROSS THE SITE IS SOMEWHAT VARIABLE. THE SURFACE SOILS EXTENDING TO BETWEEN ONE AND FOUR FEET ARE SAND, SILT AND CLAY MIXTURES OF MEDIUM LOW DENSITY. THEIR CLASSIFICATION VARIES FROM PREDOMINATELY SANDY SILTS TO SILTY CLAYS AS SHOWN BY LABORATORY GRADATION AND ATTERBERG LIMITS TESTS. THESE SOILS POSSESS LOW BEARING CAPACITY, AND, AS SHOWN BY THE CONSOLIDATION TEST RESULTS, ARE ADVERSELY EFFECTED BY INCREASING MOISTURE. THE SOILS ARE SLIGHTLY ALKALINE WITH ONE SAMPLE POSSESSING RELATIVELY LOW SOLUBLE SALTS AND ONE SAMPLE VERY HIGH SOLUBLE SALTS. FROM CURSORY EXAMINATION OF THE SITE, THE LIGHTLY COLORED SURFACE SUGGESTS THE PRESENCE OF EVAPORITES IN MANY AREAS. THE SOILS BELOW THE LOOSE SURFACE STRATUM AND EXTENDING THROUGHOUT THE REMAINING DEPTHS OF THIS INVESTIGATION ARE ALSO SAND, SILT AND CLAY

MIXTURES BUT ARE OF MEDIUM TO HIGH DENSITY. VARYING AMOUNTS OF FINE GRAVEL ARE ALSO PRESENT THROUGHOUT MUCH OF THE DEEPER SOILS WITH GRAVEL BEING IN SIGNIFICANT QUANTITY BEGINNING AT DEPTHS VARYING BETWEEN 8 AND 18 FEET BELOW THE GROUND SURFACE. LIME IS ALSO PRESENT THROUGHOUT MUCH OF THESE SOILS WITH LIME CEMENTATION BEING MODERATE TO RELATIVELY STRONG.

THE MOISTURE CONTENT OF THE SUBSOIL WAS GENERALLY LOW THROUGHOUT THE DEPTH OF INVESTIGATION. NO FREE GROUND WATER WAS ENCOUNTERED IN THE TEST BORINGS.

DISCUSSION AND RECOMMENDATIONS

FOUNDATIONS

THE PRESENCE OF RELATIVELY LOOSE SURFACE SOILS EXTENDING TO BETWEEN ONE TO FOUR FEET WILL COMPLICATE THE DESIGN OF SHALLOW SPREAD FOOTINGS IN SOME AREAS. DUE TO THE ADVERSE EFFECT THAT INCREASING MOISTURE HAS ON THE COMPRESSIBILITY OF THESE SOILS, THE FOOTINGS SHOULD BEAR UPON THE DEEPER MEDIUM TO DENSE SOILS UNLESS THE LOOSE SURFACE SOILS ARE COMPACTED.

SHALLOW SPREAD FOOTINGS BEARING UPON MEDIUM TO DENSE UNDISTURBED SOIL OR RECOMPACTED SURFACE SOIL WILL BE SUITABLE FOR THE SUPPORT OF LIGHT TO MODERATELY HEAVY FOUNDATION LOADS. A SOIL BEARING PRESSURE OF 2000 P.S.F. TO 4000 P.S.F. IS INDICATED DEPENDING UPON THE DENSITY OF THE SUBSOILS WITHIN INDIVIDUAL BUILDING AREAS. TWO (2.0) FEET AND 1.33 FEET SHOULD BE CONSIDERED THE MINIMUM WIDTH OF SHALLOW COLUMN AND WALL FOOTINGS, RESPECTIVELY.

RELATIVELY DEEP FOOTINGS WILL PROBABLY BE NECESSARY WHERE FOUNDATION LOADS EXCEED APPROXIMATELY 100 KIPS. CIRCULAR DRILLED, CAST-IN-PLACE, CAISSON TYPE FOOTINGS WILL PROBABLY PROVIDE THE MOST ECONOMICAL DEEP FOUNDATION SYSTEM. A SOIL BEARING PRESSURE OF 5000 P.S.F. TO 8000 P.S.F. IS INDICATED APPROXIMATELY TEN FEET BELOW THE GROUND SURFACE. TWO (2.0) FEET SHOULD BE CONSIDERED THE MINIMUM DIAMETER OF CIRCULAR DRILLED

SHAFTS AS IT IS DIFFICULT TO PROPERLY CLEAN AND INSPECT THE EXCAVATIONS WHEN SMALLER SIZES ARE USED. CASING SHOULD NOT BE REQUIRED DURING EXCAVATION OF CAISSON FOOTINGS, BUT IT IS PROBABLE THAT SOME SLOUGHING WILL OCCUR TO INCREASE CONCRETE QUANTITIES SOMEWHAT OVER IDEAL GEOMETRIC VOLUMES.

FLOOR SLABS AND PAVEMENT AREAS

SURFACE COMPACTION TO BETWEEN 4 AND 8 INCHES WILL BE NECESSARY PRIOR TO PLACING AND COMPACTING SUBBASE FILL AND/OR BASE COURSE MATERIALS. ON-SITE SURFACE SOILS OF LOW PLASTICITY WILL BE SUITABLE AS SUBBASE FILL, BUT CLAYEY SANDS AND SANDY CLAYS WILL HAVE TO BE CLOSELY ANALYZED CONCERNING THEIR SWELLING POTENTIAL. BASE COURSE MATERIAL BENEATH SLAB-ON-GRADE CONSTRUCTION AND PAVEMENT SURFACING WILL HAVE TO BE IMPORTED.

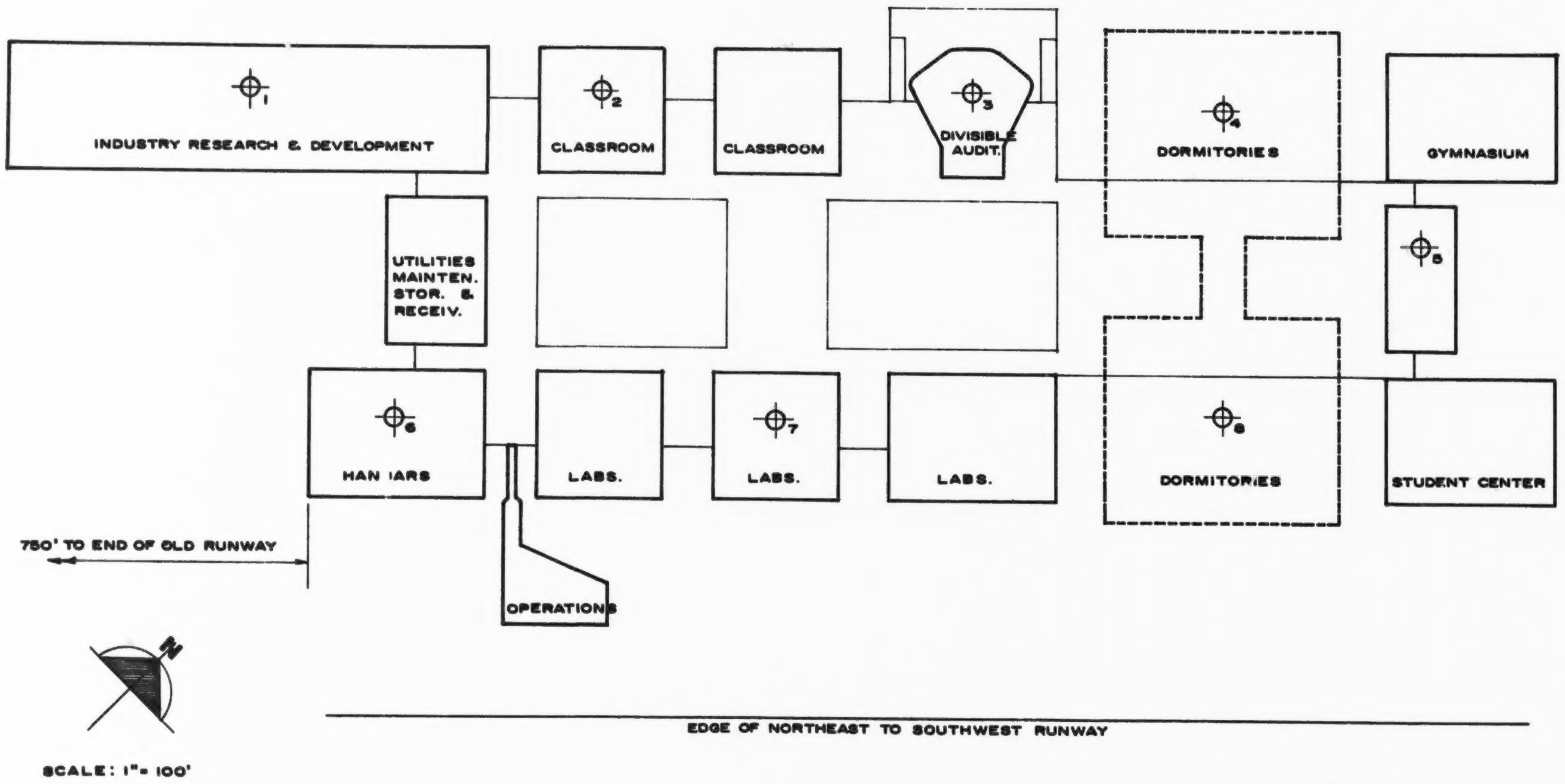
SURFACE DRAINAGE

DUE TO THE ADVERSE EFFECT THAT INCREASING MOISTURE HAS ON SUBSOILS, AND THE FACT THAT INCREASING MOISTURE WHERE THE GROUND WATER LEVEL IS DEEP IS USUALLY FROM INFILTRATING SURFACE WATERS, GOOD SITE AND SURFACE DRAINAGE SHOULD BE PROVIDED DURING CONSTRUCTION AND MAINTAINED THROUGHOUT THE LIFE OF THE STRUCTURES. IT IS RECOMMENDED THAT WHERE SIDEWALKS OR PAVING DO NOT IMMEDIATELY ADJOIN THE STRUCTURES THAT THE GROUND SURFACE BE RAISED AND SLOPED GENTLY AWAY TO PROVIDE FOR THE IMMEDIATE DRAINAGE OF SURFACE WATER. PLANTING ON THESE SLOPES SHOULD BE RESTRICTED TO GRASS OR OTHER SHALLOW ROOTED VEGETATION REQUIRING LITTLE WATER. HEAVILY LANDSCAPED AREAS LOCATED WITHIN 15 FEET OF STRUCTURES SHOULD BE CONTAINED IN WATER-TIGHT BOXES WITH PROVISIONS FOR THE REMOVAL OF EXCESS WATERS TO A MINIMUM 15 FEET FROM STRUCTURES. CONSIDERATION SHOULD ALSO BE GIVEN TO THE DRAINAGE AWAY OF ROOF RUNOFF, TO THE LOCATION OF BELOW GRADE PLUMBING AS FAR AS POSSIBLE FROM FOOTINGS IN THE EVENT OF LEAKAGE, AND TO OTHER POSSIBLE

SOURCES OF MOISTURE. BACKFILL AGAINST FOOTINGS, GRADE BEAMS AND OF UTILITY LINE TRENCHES SHOULD BE WELL COMPACTED TO MINIMIZE THE POSSIBILITY OF MOISTURE INFILTRATION THROUGH LOOSE SOILS.

CORROSION AND LANDSCAPING

THE PERCENTAGE OF SOLUBLE SALTS IS VERY HIGH IN SOME AREAS AND DETAILED INVESTIGATION SHOULD BE MADE PRIOR TO CONSTRUCTION TO DETERMINE AREAS WHERE SPECIAL MEASURES TO PROTECT CONCRETE AND PLUMBING SHOULD BE TAKEN. SOME ADDITIVE(S) WILL PROBABLY BE NECESSARY FOR HEALTHY PLANT GROWTH IN LANDSCAPED AREAS.


INDUSTRY RESEARCH & DEVELOPMENT
1
CLASSROOM
2
CLASSROOM
DIVISIBLE AUDIT.
3
DORMITORIES
4
GYMNASIUM
UTILITIES MAINTEN. STOR. & RECEIV.
5
HAN IARS
6
LABS.
LABS.
7
LABS.
DORMITORIES
8
STUDENT CENTER
750' TO END OF OLD RUNWAY
OPERATIONS
N
EDGE OF NORTHEAST TO SOUTHWEST RUNWAY
SCALE: 1"= 100'

LOCATION OF BORINGS

B. DESCRIPTION OF ELECTRICAL & COMMUNICATION SYSTEM

ELECTRICAL DISTRIBUTION SYSTEM

1) INCOMING PRIMARY FEEDERS FROM POWER COMPANY TO BE UNDERGROUND AT THE SOUTH SIDE OF AREA.

2) THESE FEEDERS TO CONSIST OF TWO DIFFERENT SOURCES OF POWER. EACH FEEDER TO BE CAPABLE OF SUPPLYING THE TOTAL LOAD TO THE ENTIRE CENTER IN CASE OF FAILURE OF ONE FEEDER OR ONE SOURCE OF SUPPLY.

3) BOTH FEEDERS TO CONTINUE UNDERGROUND TO EACH OF FIVE (5) TRANSFORMER VAULTS.

4) METERING TO BE AT EACH VAULT. PHASE I WILL BE SERVED FROM VAULT NO. 1; PHASE II FROM VAULTS NO. 2, NO. 3 AND NO. 4; PHASE III FROM VAULTS NO. 3, NO. 4 AND NO. 5.

5) PRIMARY UNDERGROUND DUCTS, MANHOLES, FEEDERS, CONNECTIONS, METERING EQUIPMENT AND TRANSFORMERS TO BE SUPPLIED, INSTALLED AND MAINTAINED BY THE POWER COMPANY.

6) TRANSFORMER VAULTS TO BE PROVIDED BY OWNER AND TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE POWER COMPANY.

7) SECONDARY POWER FROM EACH TRANSFORMER VAULT TO BE 277/480V., 3 PHASE, 4 WIRE GROUNDED NEUTRAL SERVICE.

8) SECONDARY DISTRIBUTION THROUGHOUT THE AREAS SERVED BY EACH TRANSFORMER VAULT WILL BE AT 277/480V., 3 PHASE, 4 WIRE Y-GROUNDED WITH LARGE MOTORS SERVED AT 480V., 3 PHASE AND GENERAL LIGHTING IN THE COMPLEX SERVED AT 277V. POWER AT 120/208V. WILL BE OBTAINED BY DRY

TYPE TRANSFORMERS LOCATED AS REQUIRED.

9) SECONDARY DISTRIBUTION SYSTEM TO BE VIA UTILITY TUNNEL AND UNDERGROUND DUCT BANKS WITH MANHOLES.

TELEPHONE DISTRIBUTION SYSTEM

10) INCOMING SERVICE FROM TELEPHONE COMPANY'S LINES TO BE UNDERGROUND FROM THE SOUTH SIDE APPROXIMATELY PARALLEL TO THE INCOMING POWER PRIMARY FEEDER LOCATION.

DISTRIBUTION LINES TO VARIOUS AREAS TO BE UNDERGROUND DUCT BANK. SPACE IN EACH STRUCTURE TO BE PROVIDED FOR TELEPHONE EQUIPMENT SUPPLIED AND INSTALLED BY THE TELEPHONE COMPANY AT LOCATIONS SHOWN IN THE DRAWINGS.

TYPE OF SERVICE TO BE COORDINATED WITH THE TELEPHONE COMPANY IN ACCORDANCE WITH NEEDS OF THE OWNER.

FIRE ALARM SYSTEM

11) MAIN EQUIPMENT, CONTROL PANEL, ANNUNCIATOR

PANEL, ETC., TO BE LOCATED IN THE CAMPUS SERVICES OFFICE. DISTRIBUTION LINES TO MANUAL STATIONS, BELLS, DETECTORS, ETC., TO RUN IN UTILITY TUNNEL AND THRU MANHOLES USED FOR TELEPHONE LINES, BUT IN SEPARATE DUCTS AND CONDUIT RUNS.

TV (CLOSED CIRCUIT SYSTEM)

12) SEPARATE DUCTS IN UTILITY TUNNEL TO BE PROVIDED FOR THIS SYSTEM. ALL AREAS OF THE CAMPUS TO BE INCLUDED.

EMERGENCY POWER

13) GENERATOR UNITS TO BE PROVIDED FOR ESSENTIAL REQUIREMENTS TO PROVIDE POWER AT 277/480v. IN THE EVENT OF TOTAL POWER FAILURE. ONE UNIT TO BE PROVIDED FOR EACH AREA SERVED BY EACH OF THE FIVE TRANSFORMER VAULTS.

PARKING AREA LIGHTING

14) TO BE SUPPLIED WITH UNDERGROUND DISTRIBUTION FROM THE NEAREST TRANSFORMER VAULT SWITCH-ROOM, AS SHOWN ON THE DRAWINGS.

RUNWAY LIGHTING

15) TO BE PROVIDED WITH A SYSTEM AS REQUIRED BY REGULATIONS AND FED FROM TRANSFORMER VAULT OF NO. 1 WITH A SEPARATE HIGH VOLTAGE DISTRIBUTION SYSTEM AND INDIVIDUAL STEP DOWN TRANSFORMERS ALONG THE LENGTH OF THE STRIP.

C. DESCRIPTION OF MECHANICAL SYSTEMS - WATER
SEWER
AIR CONDITIONING

HEATING AND AIR CONDITIONING

CHILLED AND HOT WATER GENERATORS FOR A/C AND DOMESTIC WATER WILL BE LOCATED IN UTILITIES CENTRAL PLANT TOGETHER WITH COOLING TOWERS AND CENTRAL CONTROL CONSOLE TO START, STOP AND RESET ALL PUMPS, AIR HANDLING UNITS, BOILERS, ETC., AND TEMPERATURE HUMIDITY READ OUT AND RESET.

CENTRAL PLANT EQUIPMENT WILL CONSIST OF: TWO CENTRIFUGAL CHILLERS APPROXIMATELY 1,000 TONS EACH WITH EVAPORATOR SHELLS ASSEMBLED IN SERIES, SO AS TO MAXIMIZE CHILLED WATER TEMPERATURE DIFFERENTIAL AND CONSEQUENTLY DECREASE PUMPING AND PIPE LINES COST.

THREE CHILLED WATER PUMPS WILL BE PROVIDED ASSEMBLED IN PARALLEL; TWO WILL BE NORMALLY WORKING WITH A THIRD PUMP ACTING AS STANDBY.

COOLING TOWERS WILL BE OF THE TWO CELL TYPE WITH FULL WALL PARTITION, SO THAT EACH CELL MAY BE INDEPENDENTLY OPERATED; AGAIN THE SAME TYPE OF PUMPING AS MENTIONED FOR THE CHILLED WATER WILL BE USED.

HOT WATER GENERATORS WILL BE OF THE PACKAGED SCOTCH-MARINE TYPE, FIRE TUBE BOILERS, FORCED DRAFT, GAS FIRED; SAME PUMPING SYSTEM AS HEREINBEFORE DESCRIBED WILL BE UTILIZED.

A FOUR PIPE DISTRIBUTION SYSTEM SHALL BE PROVIDED FOR HEATING AND COOLING WITH PIPES LOCATED IN UTILITY TUNNELS. PRIMARY-SECONDARY PUMPING SYSTEM WILL BE EMPLOYED TO DISTRIBUTE CHILLED AND HOT WATER. PRIMARY PUMPS WILL BE LOCATED AT UTILITY CENTRAL PLANT AND ARRANGED AS HEREINBEFORE SPECIFIED. SECONDARY LOOP PUMPS WILL BE STRATEGICALLY LOCATED AS SHOWN ON THE DRAWINGS AND ARRANGED IN THE FOLLOWING MANNER:

TWO CHILLED WATER PUMPS ASSEMBLED IN PARALLEL WITH

SECONDARY MIXING VALVES; HOT WATER HEAT EXCHANGER WITH CIRCULATING PUMP ON PRIMARY LOOP SIDE WITH A SINGLE PUMP CIRCULATING THRU SHELL OF HEAT EXCHANGER TO THE TERMINAL UNIT COILS.

TERMINAL AIR UNITS, IN GENERAL, WILL BE OF THE CENTRAL STATION TYPE, SINGLE ZONE OR MULTIZONE, EXCEPT DORMITORIES, WHICH WILL HAVE INDIVIDUAL FAN COIL UNITS SERVED BY A CENTRAL PRIMARY AIR UNIT. IN GENERAL, CLASSROOMS, LABORATORIES AND OFFICE SPACES WILL BE SERVED BY MULTIZONE UNITS WITH THE EXCEPTION OF LABORATORY AREAS WHERE ELEMENTS OF A TOXIC NATURE MAY BE EMPLOYED IN THESE AREAS, SINGLE ZONE UNITS WILL BE USED TO AVOID CROSS-CONTAMINATION.

DUE TO THE LIMITED AREA TO BE BUILT IN THE FIRST PHASE, IT IS RECOMMENDED THAT CONTROL TOWER AND BUILDING BE AIR CONDITIONED UTILIZING A PACKAGE AIR COOLED RECIPROCATING CHILLER.

HANGARS WILL NOT BE AIR CONDITIONED, BUT SIMPLY HEATED WITH UNIT HEATERS AND VENTILATED USING ROOF MOUNTED GRAVITY VENTILATORS.

DOMESTIC AND FIRE WATER

SOURCE OF WATER WILL BE THRU DEEP WELL(S) APPROXIMATELY 600 FEET DEEP, AND OF 16 INCHES IN DIAMETER TO DELIVER A MINIMUM OF 1,500 GPM. AN UNDERGROUND STORAGE TANK WILL SERVE BOTH DOMESTIC WATER AND FIRE WATER NEEDS.

ENGINE AND ELECTRIC DRIVEN WELL AND FIRE BOOSTER PUMPS, TOGETHER WITH CONSTANT PRESSURE ELECTRIC DRIVEN DOMESTIC WATER PUMPS WILL BE LOCATED AT OR NEAR TO THE UTILITIES CENTRAL PLANT.

AN 8 INCH FIRE MAIN AND 6 INCH DOMESTIC WATER MAIN LOOPS SHALL BE PROVIDED. THESE WILL BE LOCATED AT THE UTILITY

TUNNEL AND WILL HAVE SUFFICIENT PRESSURE TO SERVE ALL AREAS OF THE COMPLEX, EXCEPT DORMITORIES AT WHICH ELECTRIC DRIVEN FIRE AND DOMESTIC WATER PUMPS SHALL BE PROVIDED.

DOMESTIC HOT WATER WILL BE GENERATED AT UTILITIES CENTRAL PLANT AND ROUTED VIA UTILITY TUNNELS TO ALL AREAS.

FIRE PROTECTION SYSTEM WILL CONSIST OF FIRE HYDRANTS OUTSIDE THE STRUCTURES AND STAND PIPE SYSTEMS FOR DORMITORIES, AUDITORIUM AND GYMNASIUM. FIRE SPRINKLERS SHALL BE PROVIDED FOR AUDITORIUM STAGE AND HANGARS. FIRE PROTECTION SYSTEM SHALL BE OF THE QUICK FLOODING FOAM TYPE.

SANITARY SEWERS

A GRAVITY SYSTEM OF SEWERS AND MANHOLES SHALL BE PROVIDED AROUND THE STRUCTURES, AS SHOWN ON THE DRAWINGS.

SEWER OUTFALL WILL BE AT MANHOLE CONSTRUCTED BY CITY OF CHANDLER APPROXIMATELY AT SOUTHWEST CORNER OF OUR PROPERTY.

SIZE OF SEWER OUTFALL IS BASED ON A MAXIMUM POPULATION OF 3,000 WITH AN AVERAGE FLOW OF 100 G.P.D. PER PERSON AND A MAXIMUM SURGE LOAD OF 250 G.P.D. PER PERSON.

GAS SYSTEM

NATURAL GAS WILL BE BROUGHT INTO THE CAMPUS BY EL PASO NATURAL GAS COMPANY.

GAS WILL BE ROUTED IN UTILITY TUNNELS TO SERVE UTILITIES CENTRAL PLANT, STUDENT CENTER, LABORATORIES AND ANY OTHER AREAS AS REQUIRED.

UNDERGROUND DISTRIBUTION WITHIN CAMPUS TUNNELS WILL BE THRU A MEDIUM PRESSURE SYSTEM (APPROXIMATELY 20 PSIG), WITH PRESSURE REDUCING AND REGULATING VALVES AT EACH ZONE.

V. FINANCIAL PLANNING

INTRODUCTION

CONTACTS WITH INDUSTRY REPRESENTATIVES DURING THE FEASIBILITY STUDY INDICATED THAT THE INDUSTRY WAS KEENLY INTERESTED IN AND HOPEFUL FOR SIGNIFICANT ADVANCEMENTS IN THE DEVELOPMENT OF EDUCATIONAL MATERIALS, ALONG WITH TEACHING METHODS AND TECHNIQUES IN AVIATION TRAINING PROGRAMS. THE EMPHASIS WAS ALWAYS LESS ON THE QUANTITATIVE AND MORE ON THE QUALITATIVE RESULTS DESIRED, I.E., MORE EFFORT SHOULD BE DEVOTED TO ADVANCING THE "STATE-OF-THE-ART" IN EDUCATION AND TO UPGRADING THE PROFESSIONALISM OF SKILLED AVIATION PERSONNEL.

ANOTHER STRONG IMPRESSION GAINED DURING THE STUDY WAS THAT THERE IS A GENERAL LACK OF COMMUNICATION OR DIALOGUE BETWEEN THE AVIATION INDUSTRY AND THE ACADEMIC COMMUNITY. IT IS BELIEVED THAT THIS LACK OF COMMUNICATION IS, TO A GREAT EXTENT, RESPONSIBLE FOR THE FACT THAT AVIATION OR AVIATION-ORIENTED CURRICULA HAVE NOT KEPT PACE WITH THE TECHNOLOGICAL ADVANCEMENTS IN THE FIELD OF AVIATION (THE EXCEPTION IS ENGINEERING). IT IS FELT THAT THIS PROBLEM COULD BE OVERCOME WITH PROGRAMS WHICH WOULD PROVIDE FOR MORE INTERACTION BETWEEN INDUSTRY REPRESENTATIVES AND EDUCATORS, RESULTING IN GREATER UNDERSTANDING AND INVOLVEMENT ON THE PART OF ALL CONCERNED.

ON THE BASIS OF THE FOREGOING, IT WAS CONCLUDED THAT A CENTRAL AVIATION TRAINING CENTER IN WHICH THE INDUSTRY, THE FEDERAL GOVERNMENT, AND THE ACADEMIC COMMUNITY EACH PLAYED A ROLE ON A COOPERATIVE BASIS COULD SOLVE BOTH THE FINANCIAL AND THE QUALITY CONTROL PROBLEMS RELATED TO THE AVIATION TRAINING NEEDS OF THE NATION.

SUCH A CENTER WOULD NOT ONLY TRAIN A SIGNIFICANT NUMBER OF SKILLED AVIATION PERSONNEL TO THE DESIRED QUALITATIVE LEVELS BUT, MORE IMPORTANTLY, IT COULD CONDUCT THE RESEARCH IN EDUCATION NECESSARY FOR THE ADVANCEMENT OF AVIATION CURRICULA AND THE DEVELOPMENT OF IMPROVED TEACHING METHODS AND TECHNIQUES. THE RESULTS OF SUCH ACTIVITY WOULD BE EXTREMELY BENEFICIAL TO THE INDUSTRY, THE GOVERNMENT, AND ALL EDUCATIONAL INSTITUTIONS ENGAGED IN AVIATION TRAINING.

A WORKING RELATIONSHIP, AS DESCRIBED ABOVE, IS NOW BEING DEVELOPED THROUGH THE ESTABLISHMENT OF A NON-PROFIT AVIATION EDUCATION FOUNDATION TO WORK WITH THE UNIVERSITY ON A JOINT COOPERATIVE BASIS. THE FOUNDATION WILL ACTUALLY CONDUCT THE FLIGHT TRAINING PORTION OF THE TOTAL PROGRAM AND, ALSO, PERFORM SOME OF THE RESEARCH IN EDUCATION, AS APPROPRIATE. THE FOUNDATION WILL BE A MEMBERSHIP ORGANIZATION, INCLUDING AVIATION AND RELATED INDUSTRIES ALONG WITH EDUCATIONAL INSTITUTIONS ENGAGED IN AVIATION TRAINING, AND WILL PROVIDE THE BASIS FOR THE INDUSTRY AND THE ACADEMIC COMMUNITY TO COMMUNICATE AND INTERACT ON PROBLEMS OF MUTUAL INTEREST AND CONCERN IN THE AREA OF AVIATION EDUCATION.

THE BOARD OF DIRECTORS OF THE FOUNDATION WILL BE COMPRISED OF LEADING AVIATION AND EDUCATION PERSONNEL. THIS WILL PROVIDE THE INDUSTRY AND OTHER ACADEMIC INSTITUTIONS WITH A VOICE IN THE POLICY AND QUALITY CONTROL IN MATTERS RELATED TO AVIATION TRAINING AND RESEARCH IN EDUCATION CONDUCTED AT THE CENTER.

THE FINANCIAL PLAN

AN EXAMINATION OF THE COSTS ESTIMATED FOR THE ESTABLISHMENT AND OPERATION OF THE PROPOSED AIR TRANSPORTATION TRAINING CENTER LEADS TO THE OBVIOUS CONCLUSION THAT ARIZONA STATE UNIVERSITY CANNOT, BY ITSELF, FINANCE THE PROGRAM. BECAUSE OF THE NATIONAL CHARACTER OF THE PROPOSED CENTER, IT WOULD CAUSE AN UNFAIR FINANCIAL BURDEN TO BE PLACED ON THE LOCAL OR STATE TAXPAYER TO PROVIDE THE NECESSARY FINANCES FOR THE PROPOSED CENTER. ON THE BASIS OF THE FOREGOING DISCUSSION, IT IS SUGGESTED THAT THE COST OF FINANCING THE PROPOSED CENTER BE SHARED IN ACCORDANCE WITH THE FOLLOWING GENERAL PLAN AND THE SUMMARY OF COST ESTIMATES SHOWN ON THE FOLD-OUT PAGE ENTITLED "FACILITIES AND EQUIPMENT COST ANALYSIS FOR AVIATION TRAINING CENTER".

THE AVIATION INDUSTRY: THE ROLE OF THE AVIATION INDUSTRY IN THE ESTABLISHMENT AND OPERATION OF THE PROPOSED AIR TRANSPORTATION TRAINING CENTER WILL BE TO SUPPORT A PRIVATE, NON-PROFIT ORGANIZATION WHICH WILL REPRESENT ALL SEGMENTS OF THE AVIATION INDUSTRY, THE FEDERAL GOVERNMENT, AND EDUCATIONAL INSTITUTIONS ON MATTERS RELATED TO AVIATION EDUCATION.

THE MEMBERSHIP-TYPE, NON-PROFIT FOUNDATION WILL PROVIDE THE MEANS FOR MAXIMUM INVOLVEMENT AND REPRESENTATION FOR THE VARIOUS SEGMENTS OF OUR SOCIETY CONCERNED WITH THE PROBLEMS OF AVIATION EDUCATION. MEMBERSHIP FUNDS WILL BE USED TO OPERATE THE ORGANIZATION AND TO UNDERWRITE A PORTION OF THE COST OF OPERATING THE PROPOSED TRAINING CENTER. AS A NON-PROFIT ORGANIZATION, ITS MEMBERS WILL BE PERMITTED TO DEDUCT MEMBERSHIP FEES AND OTHER GIFTS AND CONTRIBUTIONS FROM INCOME TAXES.

THE NON-PROFIT FOUNDATION HAS BEEN ESTABLISHED AND IS ASSUMING THE FOLLOWING RESPONSIBILITIES IN CONNECTION WITH THE PROPOSED AIR TRANSPORTATION TRAINING CENTER:

1. IT WILL ENTER INTO NEGOTIATIONS WITH THE INDIAN TRIBAL GOVERNMENT FOR A NINETY-NINE-YEAR LEASE FOR THE SITE UPON WHICH THE PROPOSED AIR TRANSPORTATION TRAINING CENTER WILL BE CONSTRUCTED. THE SITE IS COMPRISED OF SLIGHTLY OVER 1,349 ACRES, AND AN ACCEPTABLE LEASE PRICE WILL BE NEGOTIATED WITH THE TRIBAL GOVERNMENT AND THIS LEASE PRICE WILL BE PRORATED TO ALL OF THE TENANTS OCCUPYING THE SITE. THE SITE INCLUDES TWO RUNWAYS -- ONE OF WHICH IS IN EXCELLENT CONDITION,

9,200 FEET IN LENGTH AND 150 FEET WIDE. THE SECOND RUNWAY IS 5,500 FEET IN LENGTH AND 300 FEET WIDE. IT IS PLANNED TO REMOVE THE SHORTER RUNWAY FROM ACTIVE FLIGHT SERVICE AND TO USE IT AS A TAXIWAY AND AS RAMP TIEDOWN SPACE IN SUPPORT OF THE FLIGHT TRAINING OPERATIONS AND OTHER AVIATION ACTIVITIES WHICH ARE PLANNING TO LEASE SPACE ON THE AIRFIELD.

2. THE NON-PROFIT FOUNDATION IS ALSO ASSUMING THE RESPONSIBILITY FOR ALL SITE DEVELOPMENT ON THE AIRFIELD SITE, INCLUDING THE CONSTRUCTION OF STREETS, ROADS, ELECTRICAL, WATER AND SEWER SYSTEMS -- ALL OF THE DEVELOPMENT REQUIRED SHORT OF FACILITIES. FUNDS FOR THE PURPOSE OF SITE DEVELOPMENT ARE BEING SOLICITED IN A PROPOSAL TO THE ECONOMIC DEVELOPMENT ADMINISTRATION. UPON ACCEPTANCE OF THE SITE DEVELOPMENT PROPOSAL, THE ECONOMIC DEVELOPMENT ADMINISTRATION WOULD PROVIDE 80% OF THE FUNDS IN THE FORM OF A GRANT, WITH THE BALANCE OF THE FUNDING (20%) BEING PROVIDED ON A LONG-TERM, LOW INTEREST LOAN BASIS. THE LOAN WILL BE REPAID TO THE ECONOMIC DEVELOPMENT ADMINISTRATION BY THE NON-PROFIT FOUNDATION. THE FUNDS REQUIRED FOR THE SITE DEVELOPMENT PROGRAM ARE SHOWN AS LINE ITEM 1 IN THE COST ANALYSIS FOLD-OUT PAGE.

3. THE NON-PROFIT FOUNDATION WILL ALSO ASSUME THE RESPONSIBILITY FOR THE CONSTRUCTION OF FLIGHT TRAINING FACILITIES, INCLUDING AN OPERATIONS BUILDING AND SUITABLE HANGARS, AND ALSO THE PROCUREMENT OF FLIGHT TRAINING AIRCRAFT AND SUPPORT EQUIPMENT. THE COST ESTIMATES FOR THE CONSTRUCTION OF THE FACILITIES AND THE PROCUREMENT OF THE EQUIPMENT ARE SHOWN AS LINE ITEM 2 OF THE COST ANALYSIS FOLD-OUT PAGE. IT IS PLANNED TO OBTAIN LONG-TERM LOANS -- BOTH FOR THE CONSTRUCTION OF THE FACILITIES AND THE PROCUREMENT OF THE FLIGHT TRAINING EQUIPMENT -- TO BE REPAID WITH FUNDS DERIVED FROM MEMBERSHIP FEES.

4. THE NON-PROFIT FOUNDATION WILL ALSO ASSUME THE RESPONSIBILITY FOR THE OPERATION OF THE FLIGHT TRAINING PROGRAM AT THE AIR TRANSPORTATION TRAINING CENTER. THE ESTIMATED COSTS FOR THE OPERATION OF THE FLIGHT TRAINING CENTER FOR 1,000 STUDENTS ARE APPROXIMATELY $900,000 AND, FOR 2,000 STUDENTS, APPROXIMATELY $1,800,000. THE COSTS FOR CONDUCTING THE FLIGHT TRAINING OPERATIONS WILL BE MOSTLY DEFRAYED BY CHARGING THE STUDENTS AN ACCEPTABLE FEE FOR THE TRAINING PROGRAM AND PARTLY WITH MEMBERSHIP FEES, GIFTS, AND CONTRIBUTIONS.

THE FOUNDATION WILL ALSO CONDUCT RESEARCH IN AVIATION TRAINING, AS APPROPRIATE, AND PARTICIPATE WITH THE UNIVERSITY AND OTHER AGENCIES IN AVIATION EDUCATION RESEARCH ACTIVITIES OF MUTUAL INTEREST. THESE ACTIVITIES WILL BE FINANCED WITH FUNDS PROVIDED FOR SPECIFIC RESEARCH PROGRAMS FROM GOVERNMENT, INDUSTRY, OTHER FOUNDATIONS AND FROM PRIVATE PHILANTHROPIC SOURCES.

THE ACTIVITIES OF THE NON-PROFIT FOUNDATION, AS DESCRIBED ABOVE, WILL RESULT IN A NATIONAL CIVIL AVIATION CENTER DIRECTED BY REPRESENTATIVES OF ALL SEGMENTS OF THE AVIATION TRAINING COMMUNITY WHO ARE CONCERNED WITH AVIATION EDUCATION. IT WILL PROVIDE INDUSTRY WITH A DIRECT VOICE IN ESTABLISHING POLICY AND CONTROLLING QUALITY IN THE TRAINING OF SKILLED AVIATION PERSONNEL. IT WILL ALSO SERVE AS A DIRECT LINK BETWEEN THE INDUSTRY AND THE ACADEMIC COMMUNITY, WITH INDUSTRY'S NEEDS AND REQUIREMENTS FLOWING INTO THE CENTER AND THE INFORMATION, KNOWLEDGE, AND SKILLS FLOWING BACK TO THE INDUSTRY FROM THE CENTER AND OTHER EDUCATIONAL INSTITUTIONS ASSOCIATED THEREWITH. THE UNIVERSITY, THE LOCAL AND THE STATE'S REPRESENTATIVES ARE PROVIDING VALUABLE ASSISTANCE IN THE ESTABLISHMENT OF THE NON-PROFIT EDUCATIONAL FOUNDATION.

THE STATE OF ARIZONA: THE STATE OF ARIZONA PLANS TO ASSUME THE RESPONSIBILITY FOR THE DEVELOPMENT OF THE ACADEMIC FACILITIES AND ACQUISITION OF THE EQUIPMENT REQUIRED IN THESE FACILITIES THROUGH ARIZONA STATE UNIVERSITY. THE COSTS FOR THE FACILITIES AND EQUIPMENT ARE SHOWN AS ITEM 3 ON THE COST ANALYSIS FOLD-OUT PAGE, TOTALLING $7,604,710.00.

IT IS ASSUMED THAT APPROXIMATELY 25%, OR $1,901,178, OF THE TOTAL COST OF THE ACADEMIC FACILITIES AND EQUIPMENT WILL BE RAISED ON A

GRANT BASIS FROM GOVERNMENTAL ORGANIZATIONS, PRIVATE SOURCES, AND FOUNDATIONS. THIS WILL LEAVE APPROXIMATELY $5,703,532 TO BE FUNDED BY THE STATE OF ARIZONA WITH THE ASSISTANCE OF THE U. S. OFFICE OF EDUCATION BASIS, ARIZONA WILL COMMIT ITSELF TO A $3,422,119 OBLIGATION BETWEEN 1969 AND 1972, WHILE U.S. OFFICE OF EDUCATION FUNDS IN THE AMOUNT OF $2,281,413 WOULD BE UTILIZED OVER THE SAME PERIOD OF TIME.

THE FACULTY, STAFF AND OTHER OPERATING COSTS WILL BE UNDERWRITTEN WITH TUITION COLLECTED FROM THE STUDENTS, FROM LOCAL AND STATE TAXES, AND FROM GIFTS. THE TUITION RATES WILL BE AS ESTABLISHED BY ARIZONA BOARD OF REGENTS.

THE ARIZONA STATE UNIVERSITY WILL ALSO CONDUCT AND PARTICIPATE IN AVIATION EDUCATION RESEARCH LEADING TO THE DEVELOPMENT AND USE OF IMPROVED CURRICULA, TEACHING METHODS AND TECHNIQUES, AND EDUCATIONAL EQUIPMENT. FUNDS FOR SUCH RESEARCH WILL BE SOLICITED ON A PROJECT-BY-PROJECT BASIS FROM GOVERNMENT, FOUNDATION, AND PRIVATE SOURCES.

THE UNIVERSITY WILL PROBABLY OPERATE THE STUDENT RESIDENTIAL FACILITIES. THE COSTS FOR THESE FACILITIES AND EQUIPMENT ARE SHOWN AS ITEM 4 ON THE COST ANALYSIS FOLD-OUT PAGE. THE INITIAL COSTS FOR THE FACILITIES AND EQUIPMENT WILL BE OBTAINED, IN PART, FROM THE U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT AND THE BALANCE FROM PRIVATE INDUSTRY. THESE COSTS, PLUS THE COSTS FOR OPERATION OF THE FACILITIES, WILL BE SELF-LIQUIDATING THROUGH CHARGES TO THE STUDENT RESIDENTS.

THE FEDERAL GOVERNMENT: BECAUSE OF THE NATIONAL IMPLICATIONS OF THE SKILLED AVIATION MANPOWER REQUIREMENTS PROBLEM AND ALSO BECAUSE OF THE ECONOMIC DEVELOPMENT POTENTIAL FOR THE GILA RIVER INDIAN RESERVATION, THE FEDERAL GOVERNMENT IS EXPECTED TO PLAY AN ACTIVE ROLE IN THE ESTABLISHMENT AND OPERATION OF THE PROPOSED CENTER.

THE GOVERNMENT SHOULD ASSIST IN THE SITE AND FACILITIES DEVELOPMENT PROGRAM BY PROVIDING MAXIMUM POSSIBLE GRANTS, CONTRACTS, AND LONG-TERM, LOW INTEREST LOANS TO THE UNIVERSITY AND THE NON-PROFIT FOUNDATION. FUNDS FOR A PORTION OF THIS PURPOSE ARE AVAILABLE WITHIN THE U. S. DEPARTMENT OF COMMERCE UNDER TITLES I AND II OF THE PUBLIC WORKS AND ECONOMIC DEVELOPMENT ACT OF 1965.

OTHER GOVERNMENTAL AGENCIES, IN ADDITION TO THE U.S. DEPARTMENT OF COMMERCE, HAVE DIRECT INTERESTS IN THE PROPOSED PROGRAM AND ITS RELATED ACTIVITIES. FOR EXAMPLE, THE U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS, HAS A VITAL INTEREST IN THE PRE-VOCATIONAL, VOCATIONAL, AND SOCIAL TRAINING OF THE INDIANS TO PREPARE THEM FOR JOBS CREATED BY THE PROPOSED CENTER AND OTHER DEVELOPMENTS TAKING PLACE ON THE RESERVATION; THE U.S. DEPARTMENT OF LABOR HAS A DIRECT INTEREST IN THE TRAINING OF SKILLED PERSONNEL FOR THE NATION'S MANPOWER POOL AND TRAINING FOR THE DISADVANTAGED; THE U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, U.S. OFFICE OF EDUCATION, HAS A WIDE SPECTRUM OF INTERESTS AND RESPONSIBILITIES IN CONSTRUCTION OF EDUCATIONAL FACILITIES, THE IMPROVEMENT OF PROGRAMS, INSTRUCTION AND ADMINISTRATION IN SCHOOL SYSTEMS, IN TEACHER TRAINING AND STUDENT ASSISTANCE, AND FOR RESEARCH IN EDUCATION -- ALL OF WHICH ARE INVOLVED IN THE PROPOSED PROGRAM; AND THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION AND CIVIL AERONAUTICS BOARD, WHO HAVE DIRECT INTERESTS AND RESPONSIBILITIES IN FOSTERING, ENCOURAGING, AND ASSISTING THE DEVELOPMENT OF CIVIL AVIATION IN THIS NATION.

BECAUSE OF THE DIRECT INTERESTS AND RESPONSIBILITIES OF THE AGENCIES CITED IN MATTERS CLOSELY RELATED TO THE PROPOSED TRAINING CENTER AND THE POTENTIAL BENEFITS TO THE NATION RESULTING FROM THE EXISTENCE OF SUCH A CENTER, CONSIDERATION SHOULD BE GIVEN TO A POOLING OF RESOURCES OF THESE AGENCIES WITH THE U. S. DEPARTMENT OF COMMERCE FOR THE SUPPORT OF A COORDINATED PROGRAM WHICH WOULD BRING THE PROPOSED CENTER INTO EXISTENCE. SUCH A PROGRAM WOULD ALSO SERVE THE INTERESTS AND RESPONSIBILITIES OF THE AGENCIES CITED. EVERY EFFORT WILL BE MADE TO BRING THESE AGENCIES TOGETHER IN A COOPERATIVE VENTURE BASIS. IF THIS CANNOT BE ACHIEVED, EACH AGENCY WILL BE SOLICITED INDIVIDUALLY WITH SEPARATE PROPOSALS FOR ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF THE PROPOSED CENTER.

COST ELEMENTS	CONSTRUCTION COST ESTIMATES	CONSTRUCTION CONTINGENCY 1%	PROFESSIONAL FEES & ADM. 7%	TOTALS	PROPOSED COST DISTRIBUTION		
					FEDERAL FUNDS	OTHER SOURCES	STATE FUNDS
1. SITE DEVELOPMENT	1,694,030.00	16,940.00	118,580.00	1,829,550.00	80% EDA GRANT 20% EDA LOAN	20% LOAN NON-PROFIT ORGANIZATION	----
2. FLIGHT FACILITIES	681,300.00	6,810.00	47,690.00	735,800.00	EDA	NON-PROFIT ORGANIZATION	
FLIGHT EQUIPMENT	1,282,500.00			1,282,500.00	U.S. OFFICE OF EDUCATION	NON-PROFIT ORGANIZATION AND AVIATION INDUSTRY	----
3. ACADEMIC FACILITIES (PHASE I - 1000 STUDENTS)	4,366,080.00	43,660.00	305,630.00	4,715,370.00	U.S. OFFICE OF EDUCATION	PRIVATE FOUNDATIONS	COST SHARING
EQUIPMENT	750,000.00			750,000.00	U.S. OFFICE OF EDUCATION	PRIVATE FOUNDATIONS AND AVIATION INDUSTRY	COST SHARING
ACADEMIC FACILITIES (PHASE II - 2000 STUDENTS)	1,749,400.00	17,490.00	122,450.00	1,889,340.00	U.S. OFFICE OF EDUCATION	PRIVATE FOUNDATIONS	COST SHARING
EQUIPMENT	250,000.00			250,000.00	U.S. OFFICE OF EDUCATION (ALTERNATES: EDA, OEO)	PRIVATE FOUNDATIONS AND AVIATION INDUSTRY	COST SHARING
4. RESIDENTIAL (DORMITORIES) (PHASE I - 1000 STUDENTS)	4,500,000.00	45,000.00	315,000.00	4,860,000.00	U.S. DEPT. OF HOUSING AND URBAN DEVELOPMENT	PRIVATE INDUSTRY	----
EQUIPMENT	300,000.00			300,000.00	"	PRIVATE INDUSTRY	----
RESIDENTIAL (DORMITORIES) (PHASE II - 2000 STUDENTS)	4,500,000.00	45,000.00	315,000.00	4,860,000.00	"	PRIVATE INDUSTRY	----
EQUIPMENT	300,000.00			300,000.00	"	PRIVATE INDUSTRY	-----
TOTALS	20,373,310.00	174,900.00	1,224,350.00	21,772,560.00			

FACILITIES AND EQUIPMENT
COST ANALYSIS FOR
AVIATION TRAINING CENTER

VI. CONCLUSIONS

ON THE BASIS OF THE INFORMATION DEVELOPED DURING THE PRELIMINARY DESIGN STUDY, IT IS CONCLUDED THAT:

1. THE EDUCATIONAL OBJECTIVES ARE REALISTIC AND WILL RESULT IN QUALITATIVE IMPROVEMENTS IN AVIATION EDUCATION.

2. THE CURRICULUM IS A SOUND POINT OF DEPARTURE FOR ACCOMPLISHING THE EDUCATIONAL OBJECTIVES, EMPLOYING THE EDUCATIONAL PHILOSOPHY AND TECHNIQUES OUTLINES.

3. THE FACILITIES REFLECT THE REQUIREMENTS OF STUDENT ENROLLMENT, THE CURRICULUM AND THE EDUCATIONAL OBJECTIVES IN AN EFFICIENT AND ATTRACTIVE MANNER.

4. THE FACILITIES ARE SUFFICIENTLY FLEXIBLE TO PERMIT "TRADITIONAL" CLASSES AND COURSES IN THE INITIAL STAGES, UTILIZING TRADITIONAL METHODS AND TECHNIQUES, BUT WILL ALSO ACCOMMODATE THE MORE SOPHISTICATED MULTI-MEDIA, COMPUTER-ASSISTED LEARNING TECHNIQUES OF THE FUTURE.

5. THE PROPOSED FACILITIES WILL ACCOMMODATE THE MANY UNIQUE REQUIREMENTS OF THIS PROGRAM IN A HIGHLY MOTIVATING ATMOSPHERE.

6. THE FINANCIAL PLAN IS REALISTIC AND ATTAINABLE.

7. THE PLANNING AND CONSTRUCTION SCHEDULE IS REALISTIC AND ATTAINABLE, IF THE SITE DEVELOPMENT PROGRAM IS INITIATED WITHIN THE VERY NEAR FUTURE.

VII. RECOMMENDATIONS

ON THE BASIS OF THE INFORMATION DEVELOPED AND ANALYZED DURING THE PRELIMINARY DESIGN STUDY AND THE CONCLUSIONS SET FORTH HEREIN, IT IS RECOMMENDED THAT:

1. THE AVIATION RESEARCH AND EDUCATION FOUNDATION ENTER INTO NEGOTIATIONS WITH THE GILA RIVER INDIAN COMMUNITY FOR THE LEASING OF THE LAND ON A LONG-TERM BASIS. CONCURRENT NEGOTIATIONS WITH WILLIAMS AIR FORCE BASE WILL ALSO BE REQUIRED TO PERMIT ACCESS TO THE SITE FOR ENGINEERING STUDIES UNTIL SUCH TIME AS THE U. S. AIR FORCE RELEASES THE SITE.

2. THE AVIATION RESEARCH AND EDUCATION FOUNDATION INITIATE ACTION FOR SITE DEVELOPMENT AND FOR THE CONSTRUCTION OF THE FLIGHT FACILITIES TO PERMIT FLIGHT TRAINING OPERATIONS BY SEPTEMBER, 1969.

3. THE ARIZONA STATE UNIVERSITY INITIATE THE NECESSARY ACTIONS TO IMPLEMENT THE CONSTRUCTION AND OPERATION OF THE ACADEMIC AND RESIDENTIAL FACILITIES TO PERMIT OPERATION IN THESE FACILITIES BY SEPTEMBER, 1970.

4. THE FINANCIAL PLAN BE FURTHER DEVELOPED AND FINALIZED AND THE NECESSARY FUNDS SOLICITED FROM THE APPROPRIATE AGENCIES.

DRAWING 1

REGIONAL MAP

THE SITE AND THE REGION

THIS DRAWING REPRESENTS AN ANALYSIS OF ALL THE AREAS WITHIN THE REGION THAT MIGHT BE OF ANY INFLUENCE UPON THE CAMPUS.

THE INFORMATION INDICATED ON THIS MAP INCLUDES:

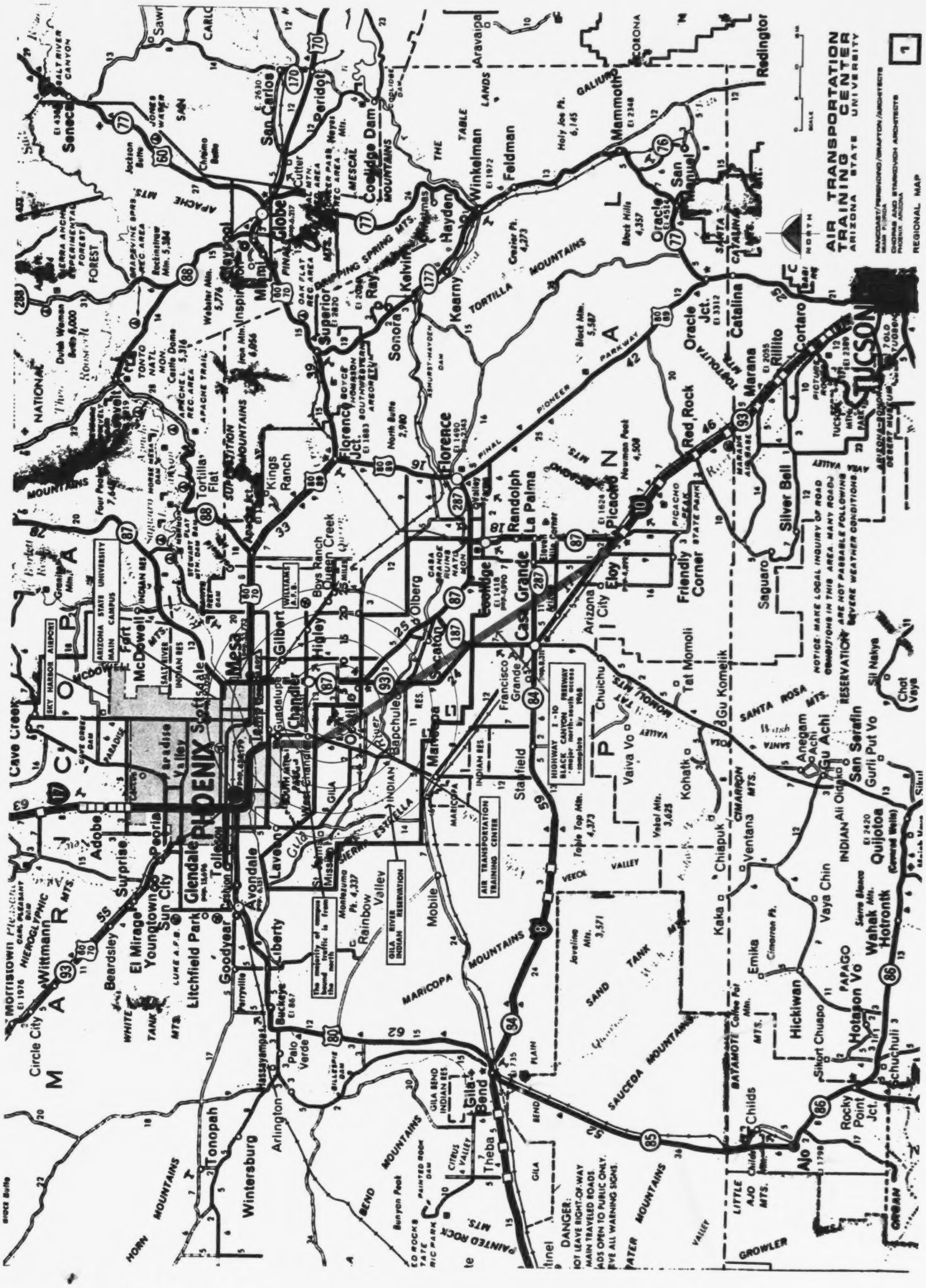
A. ALL MAJOR ROUTES

B. LOCATION OF AIR TERMINALS

C. LARGER COMMUNITIES WITH INDICATION OF POPULATION

D. LOCATION OF UNIVERSITIES, LARGE PARKS, RESERVATIONS AND RECREATION CENTERS.

VIII. DRAWINGS


AIR TRANSPORTATION TRAINING CENTER
ARIZONA STATE UNIVERSITY
REGIONAL MAP
1
NORTH
PHOENIX
Scottsdale
Mesa
Tempe
Chandler
Gilbert
Higley
Glendale
Peoria
Tolleson
Avondale
Goodyear
Litchfield Park
Sun City
Youngtown
El Mirage
Surprise
Wittmann
Circle City
Morristown
Cave Creek
Adobe
Fort McDowell
Laveen
Buckeye
Liberty
Palo Verde
Arlington
Tonopah
Wintersburg
Gila Bend
Theba
Mobile
Maricopa
Stanfield
Casa Grande
Coolidge
Eloy
Arizona City
Picacho
Randolph
La Palma
Florence
Florence Jct.
Kings Ranch
Queen Creek
Boys Ranch
Olberg
Sacaton
Bapchule
Superior
Globe
Miami
San Carlos
Peridot
Coolidge Dam
Hayden
Winkelman
Kearny
Kelvin
Ray
Sonora
Mammoth
Oracle
Oracle Jct.
Catalina
Red Rock
Marana
Rillito
Cortaro
TUCSON
Redington
Saguaro
Silver Bell
Friendly Corner
Ajo
Rocky Point Jct.
Why
Childs
Quijotoa
Sells
Santa Rosa
Hickiwan
Vaya Chin
Kaka
Chiapuk
Ventana
Kohatk
Vaiva Vo
Tat Momoli
Gu Komelik
Anegam
Chuichu
Francisco Grande
Rainbow Valley
Tortilla Flat
Seneca
MARICOPA MOUNTAINS
SAND TANK MTS.
SAUCEDA MOUNTAINS
TORTILLA MOUNTAINS
GILA BEND MOUNTAINS
PAPAGO INDIAN RESERVATION
GILA RIVER INDIAN RESERVATION
SALT RIVER INDIAN RES.
ARIZONA STATE UNIVERSITY MAIN CAMPUS
SKY HARBOR AIRPORT
WILLIAMS A.F.B.
LUKE A.F.B.
AIR TRANSPORTATION TRAINING CENTER
HIGHWAY I-10 BLACK CANYON FREEWAY complete by 1968
DANGER: DO NOT LEAVE RIGHT-OF-WAY
NOTICE: MAKE LOCAL INQUIRY OF ROAD CONDITIONS IN THIS AREA. MANY ROADS ON RESERVATION ARE NOT PASSABLE FOLLOWING SEVERE WEATHER CONDITIONS

DRAWING 2

COMMUNITY LAND USE

THE SITE AND THE COMMUNITY

THE COMMUNITY IS ANALIZED.

THE CAMPUS SITE IS SHOWN AS RELATED TO THE SURROUNDING COMMUNITY.

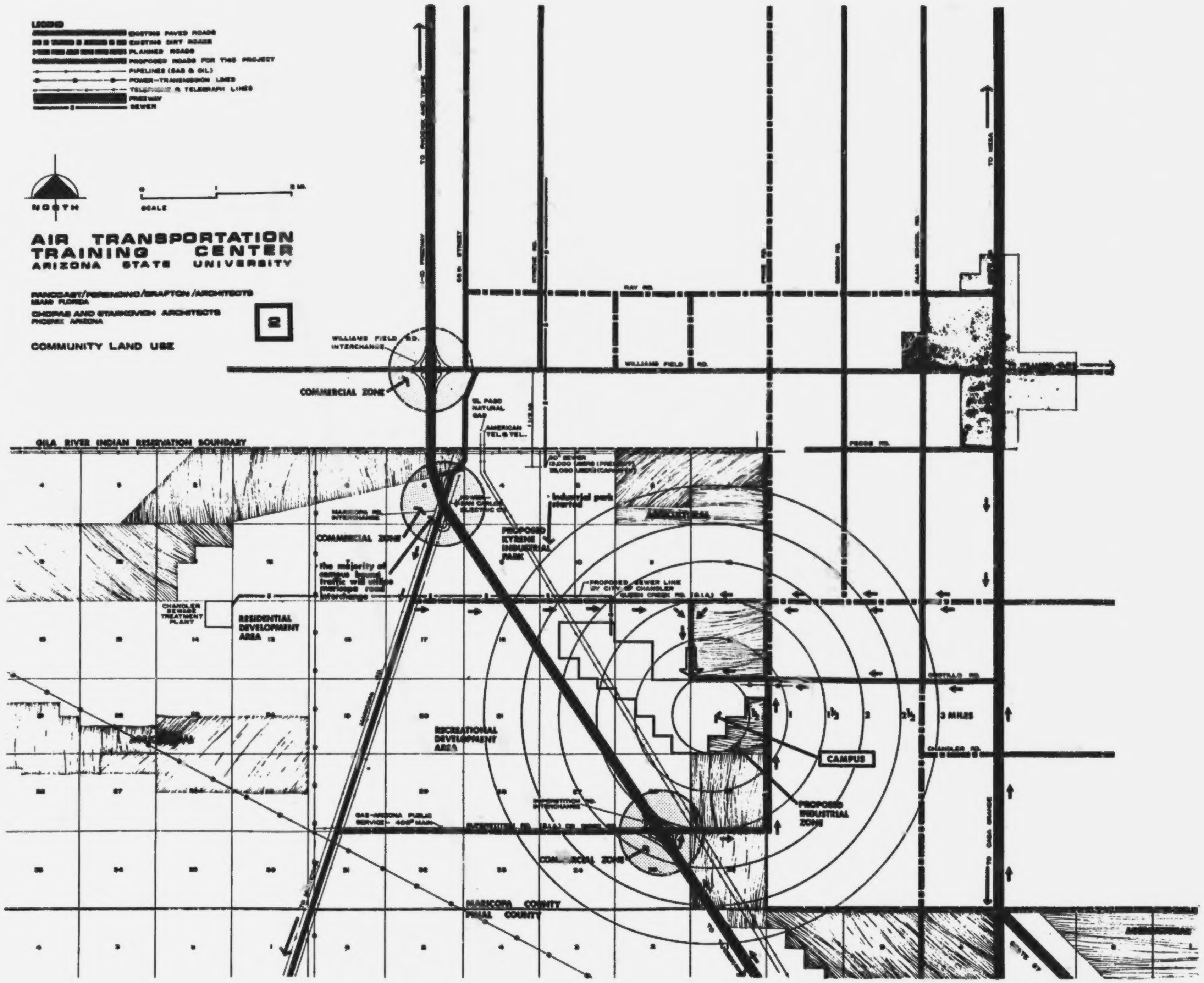
DATA INCLUDED ON THIS MAP SHOWS:

A. MAJOR TRAFFIC ARTERIES AND INTERCHANGES (EXISTING, PLANNED, OR PROPOSED)

B. MAJOR POINTS OF ACCESS TO THE CAMPUS

C. ADJACENT LAND USE AND ZONING (RESIDENTIAL, COMMERCIAL, ETC.)

D. MAJOR UTILITY FACILITIES AVAILABLE, SUCH AS: WATER, SEWAGE, GAS, ELECTRICITY AND TELEPHONE.



AIR TRANSPORTATION TRAINING CENTER
ARIZONA STATE UNIVERSITY

PANCOAST/FERENDINO/GRAFTON/ARCHITECTS
MIAMI FLORIDA
CHOPAS AND STARKOVICH ARCHITECTS
PHOENIX ARIZONA

2

COMMUNITY LAND USE

LEGEND
EXISTING PAVED ROADS
EXISTING DIRT ROADS
PLANNED ROADS
PROPOSED ROADS FOR THIS PROJECT
PIPELINES (GAS & OIL)
POWER-TRANSMISSION LINES
TELEPHONE & TELEGRAPH LINES
FREEWAY
SEWER
NORTH
0
1
2 MI.
SCALE
TO PHOENIX AND TEMPE
TO MESA
I-10 FREEWAY
56th STREET
RAY RD.
WILLIAMS FIELD RD.
WILLIAMS FIELD RD. INTERCHANGE
COMMERCIAL ZONE
EL PASO NATURAL GAS
AMERICAN TEL. & TEL.
PECOS RD.
GILA RIVER INDIAN RESERVATION BOUNDARY
MARICOPA RD. INTERCHANGE
COMMERCIAL ZONE
the majority of campus bound traffic will utilize maricopa road interchange
PROPOSED KYRENE INDUSTRIAL PARK
industrial park started
AGRICULTURAL
PROPOSED SEWER LINE BY CITY OF CHANDLER
QUEEN CREEK RD. (B.I.A.)
CHANDLER SEWAGE TREATMENT PLANT
RESIDENTIAL DEVELOPMENT AREA
RECREATIONAL DEVELOPMENT AREA
COTTILLO RD.
CHANDLER RD.
½
1
1½
2
2½
3 MILES
CAMPUS
PROPOSED INDUSTRIAL ZONE
GAS-ARIZONA PUBLIC SERVICE - 400" MAIN
COMMERCIAL ZONE
MARICOPA COUNTY
PINAL COUNTY
TO CASA GRANDE
AGRICULTURAL

DRAWING 3

SITE ANALYSIS

THE SITE

THIS DRAWING REPRESENTS AN ANALYSIS OF THE CAMPUS SITE SHOWING ITS NATURAL AND MAN-MADE FEATURES THAT MIGHT HAVE AN INFLUENCE UPON THE BUILDING LOCATIONS, CIRCULATION, PARKING, UTILITIES AND FUTURE EXPANSION.

THIS DIAGRAM CONTAINS INFORMATION SUCH AS:

A. CONTOUR LINES

B. DIMENSION AND PROPERTY LINES

C. EXISTING STRUCTURES (RUNWAYS TAXIWAYS)

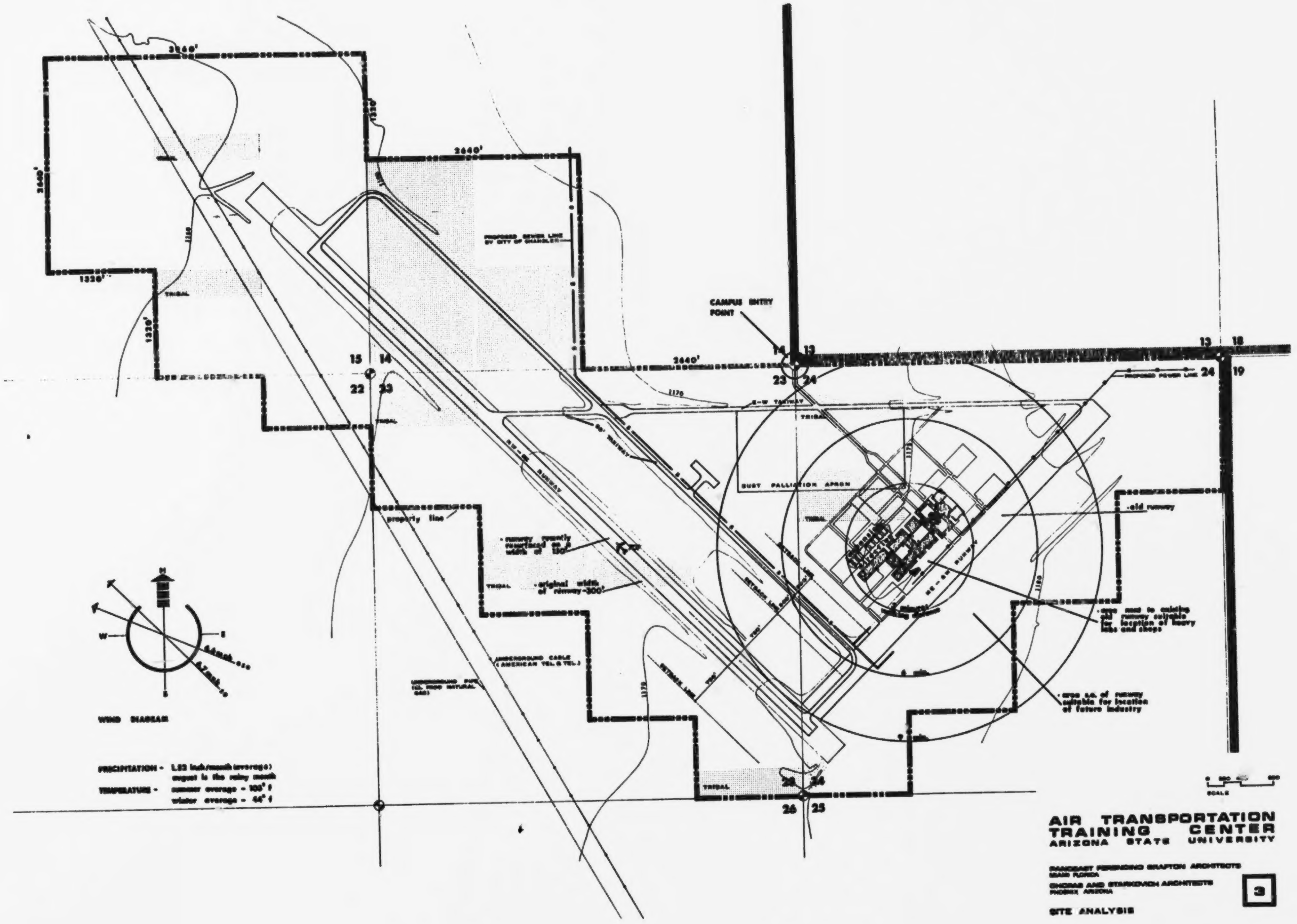
D. PROPOSED BUILDING

E. UTILITY LINES, ETC.

F. RECOMMENDED POINTS OF VEHICULAR ACCESS

G. EXPANSION DIRECTION

H. PREVAILING WINDS, TEMPERATURE, AND PRECIPITATION.


2640'
1320'
2640'
2640'
1320'
1320'
2640'
TRIBAL
1160
PROPOSED SEWER LINE
BY CITY OF CHANDLER
CAMPUS ENTRY
POINT
14
13
23
24
13
18
24
19
PROPOSED POWER LINE
15
14
22
23
1170
E-W TAXIWAY
TRIBAL
50' TAXIWAY
NW-SE RUNWAY
DUST PALLIATION APRON
TRIBAL
property line
• runway recently resurfaced as a width of 150'
TRIBAL
• original width of runway-300'
SETBACK LINE
SETBACK LINE
UNDERGROUND CABLE
(AMERICAN TEL. & TEL.)
UNDERGROUND PIPE
(EL PASO NATURAL GAS)
1170
1170
NE-SW RUNWAY
• old runway
1160
• area next to existing old runway suitable for location of heavy labs and shops
• area s.e. of runway suitable for location of future industry
TRIBAL
26
25
N
E
W
S
SCALE

WIND DIAGRAM

PRECIPITATION - 1.52 inch/month (average) august is the rainy month

TEMPERATURE - summer average - 100° f
winter average - 44° f

AIR TRANSPORTATION TRAINING CENTER
ARIZONA STATE UNIVERSITY

PANCOAST FERENDINO GRAFTON ARCHITECTS
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3

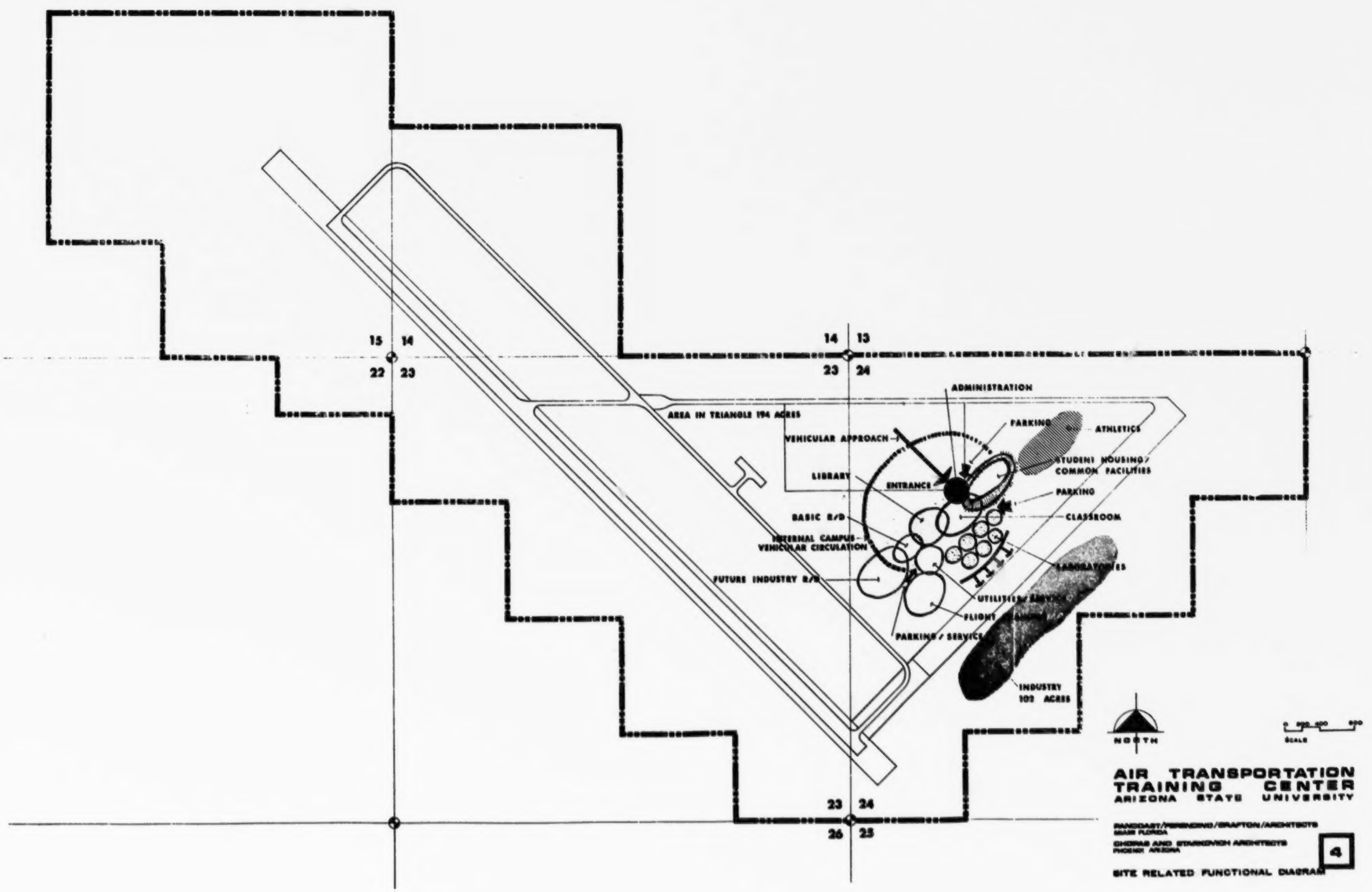
SITE ANALYSIS

DRAWING 4

SITE RELATED FUNCTIONAL DIAGRAM

THE SITE AND THE FUNCTION

THIS ILLUSTRATION SHOWS IN DIAGRAMATIC FASHION THE REQUIRED RELATIONSHIPS OF THE VARIOUS FACILITIES AND ACTIVITY AREAS AND RELATES THEM TO THE EXISTING FEATURES OF THE SITE, THE CIRCULATION ELEMENTS AND MAJOR ACCESS POINTS, WHICH ARE ALSO SHOWN.


15
14
22
23
14
13
23
24
23
24
26
25
AREA IN TRIANGLE 194 ACRES
ADMINISTRATION
PARKING
ATHLETICS
VEHICULAR APPROACH
STUDENT HOUSING/
COMMON FACILITIES
LIBRARY
ENTRANCE
PARKING
BASIC R/D
CLASSROOM
INTERNAL CAMPUS
VEHICULAR CIRCULATION
LABORATORIES
FUTURE INDUSTRY R/D
UTILITIES/SERVICE
FLIGHT
PARKING / SERVICE
INDUSTRY
102 ACRES
NORTH
0 200 400 800
SCALE

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4

SITE RELATED FUNCTIONAL DIAGRAM

DRAWING 5

TOPOGRAPHIC SURVEY

THIS SURVEY SHOWS THE ENTIRE SITE WITH ALL OF ITS NATURAL FEATURES.

THE INFORMATION INCLUDES:

A. BOUNDARIES AND THEIR RELATIONSHIP TO THE SITE

B. CONTOUR LINES AND ELEVATIONS OF THE TERRAIN

C. NATURAL FLOW OF SURFACE WATER

D. LOCATION OF RUNWAYS AND TAXIWAYS WITH INDICATION OF DIMENSIONS, ORIENTATION AND ELEVATIONS.

LEGAL DESCRIPTION FOR A.T.T.C.

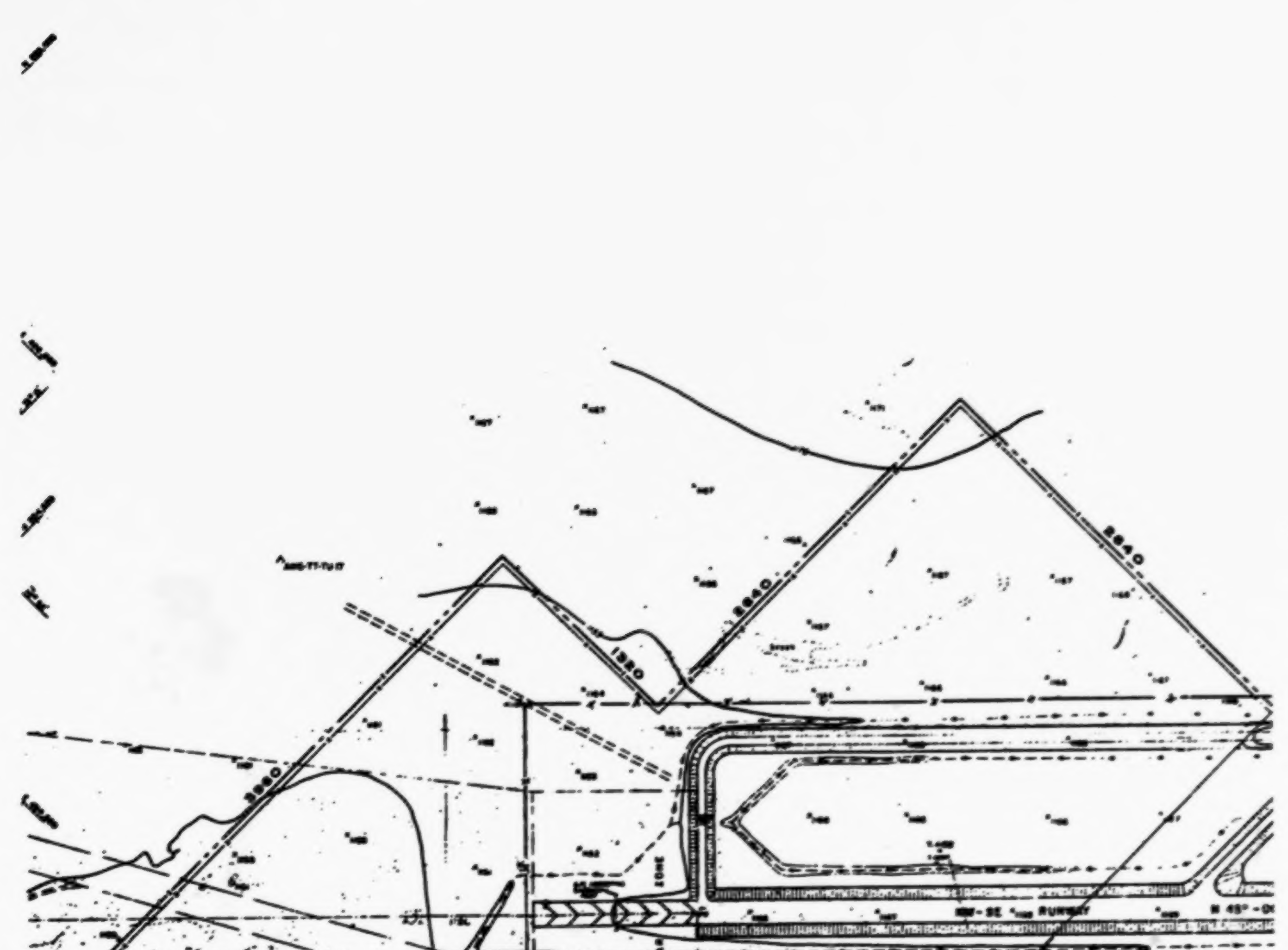
PARCELS OF INDIVIDUAL ALLOTTED AND TRIBAL LANDS, SITUATED IN SECTION 23 AND 24, TOWNSHIP TWO SOUTH (T2S), RANGE FOUR EAST (R4E), GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, CONTAINING 849.33 ACRES, MORE OR LESS, UNIMPROVED DESERT LAND, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

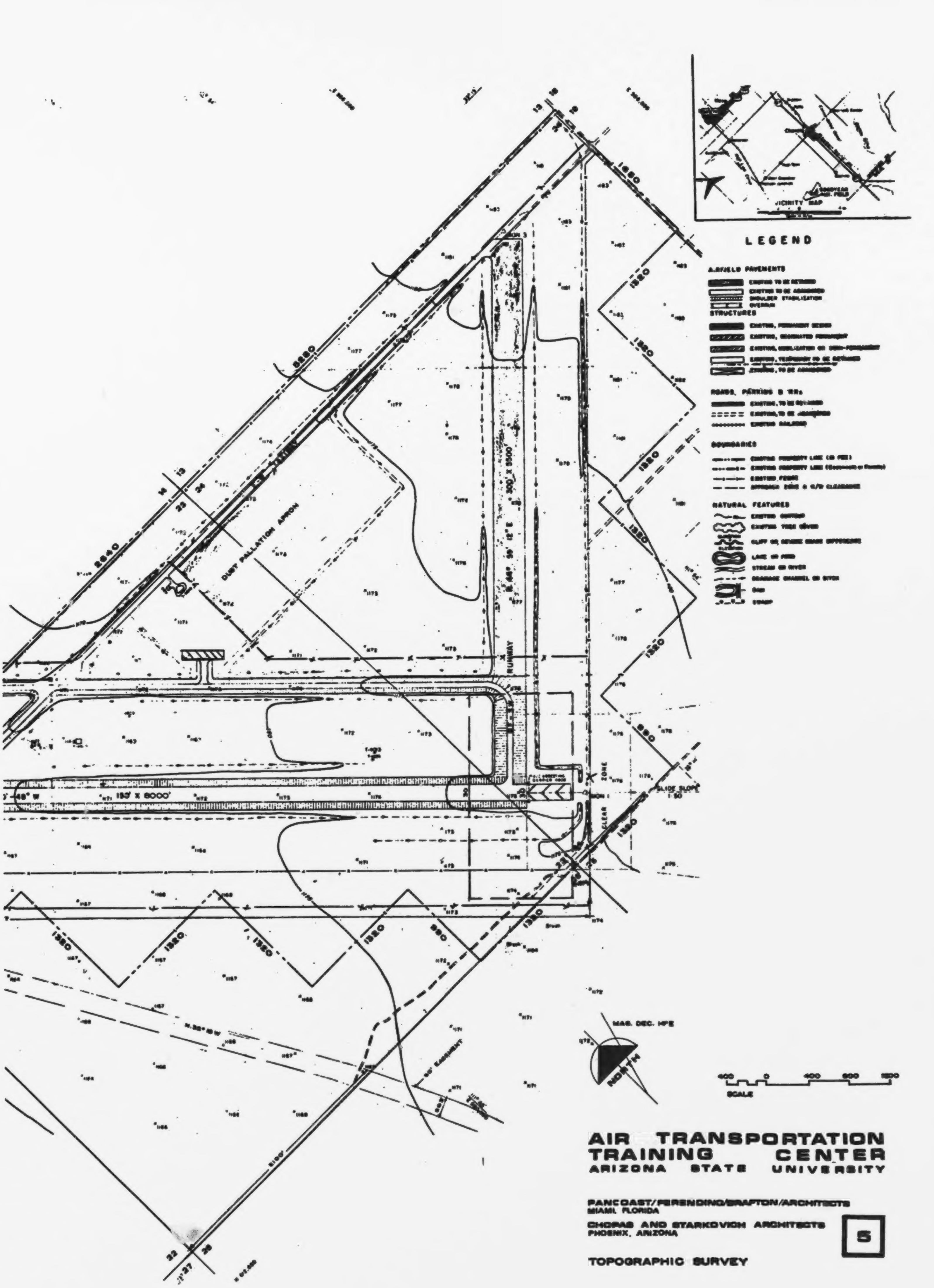
THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER (NW1/4 NW1/4); THE NORTH HALF OF THE NORTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER (N1/2 N1/2 SW1/4 NW1/4) THE EAST HALF OF THE NORTHWEST QUARTER (E1/2 NW1/4) THE NORTH HALF OF THE NORTH HALF OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER (N1/2 N1/2 NE1/4 SW1/4) THE WEST HALF OF THE NORTHEAST QUARTER (W1/2 NE1/4); THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER (NW1/4 SE1/4); THE NORTH HALF OF THE NORTH HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER (N1/2 N1/2 SW1/4 SE1/4); THE EAST HALF OF THE EAST HALF (E1/2 E1/2); ALL IN SECTION 23; AND

THE WEST HALF OF THE WEST HALF (W1/2 W1/2); THE EAST HALF OF THE NORTHWEST QUARTER (E1/2 NW1/4); THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER (NE1/4 SW1/4); THE NORTH HALF OF THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER (N1/2 N1/2 SE1/4 SW1/4); THE WEST HALF OF THE NORTHEAST QUARTER (W1/2 NE1/4); THE NORTH HALF OF THE NORTH HALF OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER (N1/2 N1/2 NW1/4 SE1/4); THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER (NE1/4 NE1/4); THE NORTH HALF OF THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER (N1/2 N1/2 SE1/4 NE1/4); ALL IN SECTION 24; TOWNSHIP TWO SOUTH (T2S), RANGE FOUR EAST (R4E), GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

PARCELS OF INDIVIDUAL ALLOTTED AND TRIBAL LANDS, SITUATED IN SECTIONS 14, 15, AND 22, TOWNSHIP TWO SOUTH (T2S), RANGE FOUR EAST (R4E), GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, CONTAINING 500 ACRES, MORE OR LESS, UNIMPROVED DESERT LAND, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

THE SOUTHWEST QUARTER (SW1/4) OF SECTION 14;
THE SOUTHEAST QUARTER (SE1/4); THE SOUTH HALF OF THE NORTHEAST QUARTER (S1/2 NE1/4); THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER (SE1/4 NW1/4); THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER (NE1/4 SW1/4); ALL IN SECTION 15; THE NORTH HALF OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER (N1/2 NE1/4 NE1/4); OF SECTION 22, TOWNSHIP TWO SOUTH (T2S), RANGE FOUR EAST (R4E), GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.


2640
2640
2640
2640
1320
1320
1320
1320
1320
960
NW-SE RUNWAY
N 45° -
CLEAR ZONE
15
16
22
23


VICINITY MAP
LEGEND
AIRFIELD PAVEMENTS
EXISTING TO BE RETAINED
EXISTING TO BE ABANDONED
SHOULDER STABILIZATION
OVERRUN
STRUCTURES
EXISTING, PERMANENT DESIGN
EXISTING, DESIGNATED PERMANENT
EXISTING, QUALIFICATION OR SEMI-PERMANENT
EXISTING, TEMPORARY TO BE RETAINED
EXISTING, TO BE ABANDONED
ROADS, PARKING & RRs
EXISTING, TO BE RETAINED
EXISTING, TO BE ABANDONED
EXISTING RAILROAD
BOUNDARIES
EXISTING PROPERTY LINE (IN FEE)
EXISTING PROPERTY LINE (Easement or Permits)
EXISTING FENCE
APPROACH ZONE & C/V CLEARANCE
NATURAL FEATURES
EXISTING CONTOUR
EXISTING TREE COVER
CLIFF OR SEVERE GRADE DIFFERENCE
LAKE OR POND
STREAM OR RIVER
DRAINAGE CHANNEL OR DITCH
DAM
SWAMP
DUST PALLIATION APRON
RUNWAY
150' X 6000'
CLEAR ZONE
GLIDE SLOPE 1:50
1320
2640
5280
MAG. DEC. 14°E
NORTH
400
0
400
800
1200
SCALE

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5

TOPOGRAPHIC SURVEY

DRAWING 6

TOTAL CAMPUS PLAN

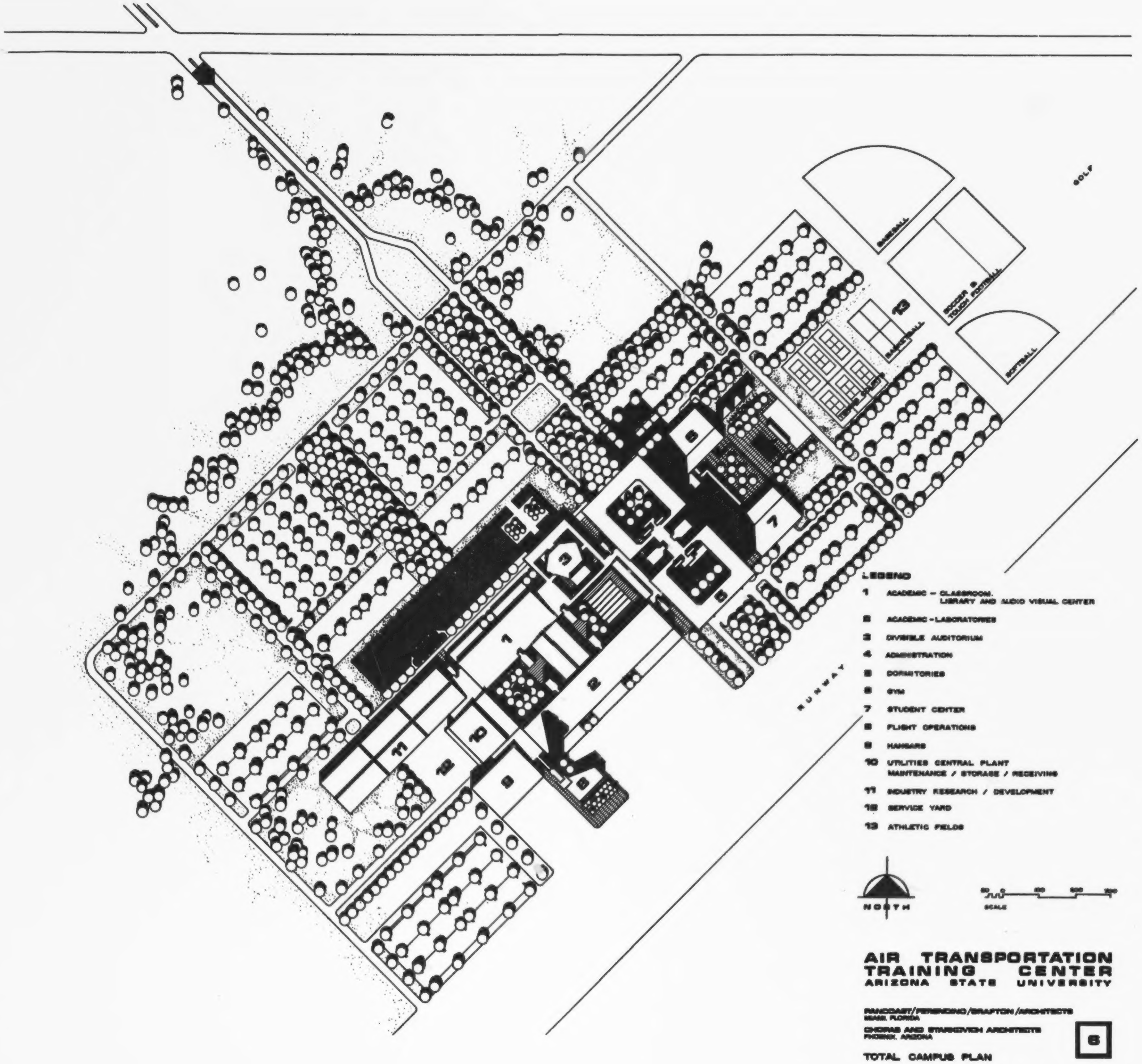
THIS DRAWING SHOWS THE CAMPUS AS A WHOLE WITH THE SPACES GROUPED TO SATISFY THE REQUIREMENTS OF THE PROPOSED EDUCATIONAL CONCEPTS.

THE INFORMATION SHOWN INCLUDES:

A. PROPOSED STRUCTURES ILLUSTRATING SPATIAL FORM AND RELATIVE SEQUENCE OF ACTIVITIES

B. GENERAL SHAPE AND LOCATION OF OUTDOORS AREAS SUCH AS, ATHLETIC, RECREATIONAL AND PARKING

C. CAMPUS ENTRY POINTS AND CIRCULATION WITHIN THE SITE.


GOLF
BASEBALL
SOCCER & TOUCH FOOTBALL
SOFTBALL
BASKETBALL
TENNIS COURTS
13
RUNWAY
1
2
3
4
5
6
7
8
9
10
11
12
NORTH
50 0 50 100 200
SCALE

LEGEND

1 ACADEMIC – CLASSROOM, LIBRARY AND AUDIO VISUAL CENTER
2 ACADEMIC – LABORATORIES
3 DIVISIBLE AUDITORIUM
4 ADMINISTRATION
5 DORMITORIES
6 GYM
7 STUDENT CENTER
8 FLIGHT OPERATIONS
9 HANGARS
10 UTILITIES CENTRAL PLANT MAINTENANCE / STORAGE / RECEIVING
11 INDUSTRY RESEARCH / DEVELOPMENT
12 SERVICE YARD
13 ATHLETIC FIELDS

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6

TOTAL CAMPUS PLAN

DRAWING 7

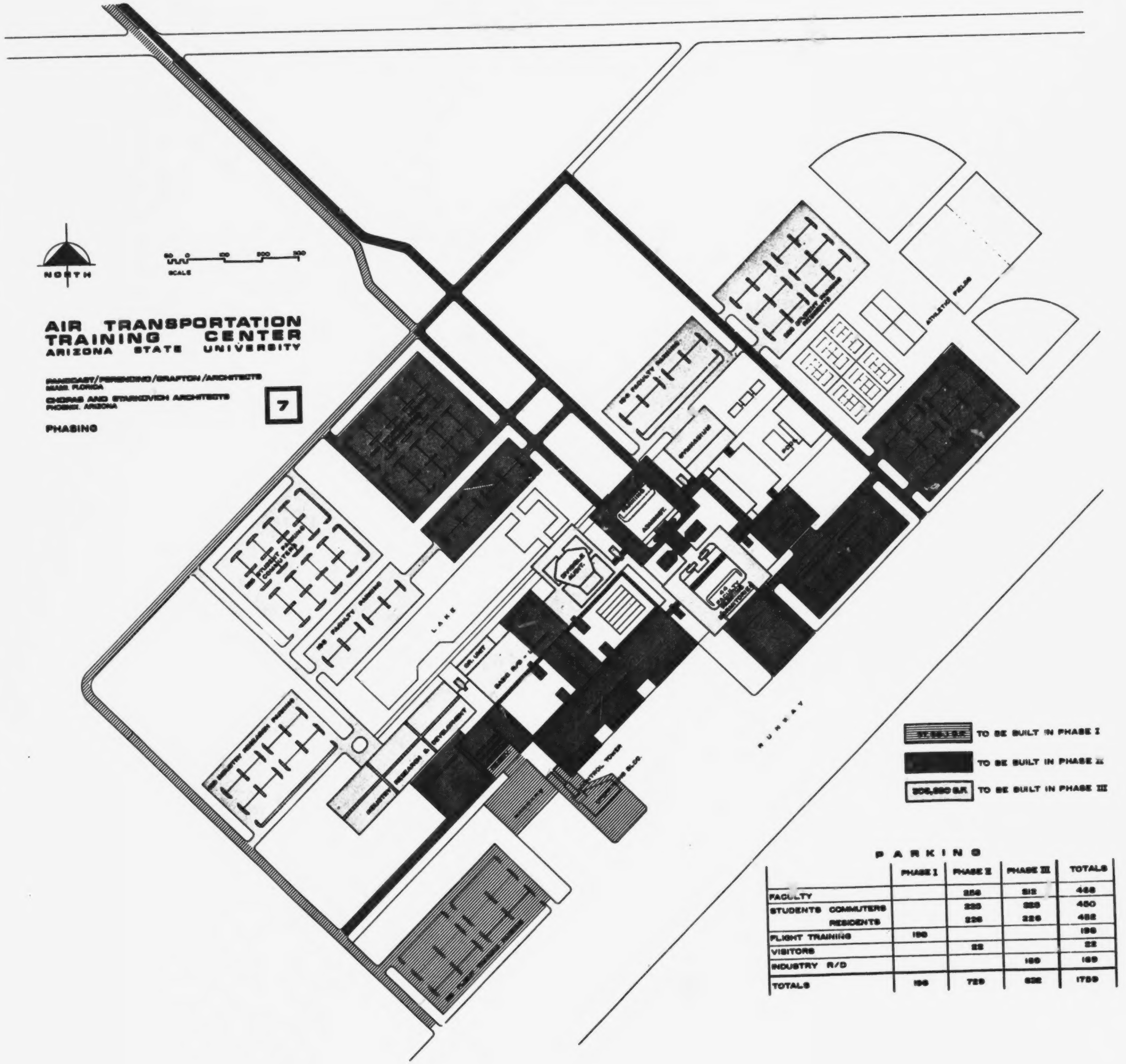
PHASING

THIS DRAWING SHOWS THE VARIOUS PHASES OF CONSTRUCTION BASED ON THE ANALYSIS OF THE EXPECTED ENROLLMENT AND THE AVAILABILITY OF PLANNING AND CONSTRUCTION FUNDS.

INFORMATION CONTAINED:

A. STRUCTURES TO BE BUILT IN EACH PHASE

B. LAY OUT OF ROADS AND PARKING AREAS (ACCORDING TO PHASING) WITH INDICATION OF NUMBER OF PARKING SPACES.


NORTH
50 0 100 200 300
SCALE
ATHLETIC FIELD
GYMNASIUM
POOL
FACULTY PARKING
LAKE
RUNWAY
CONTROL TOWER
RESEARCH & DEVELOPMENT

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7

PHASING

▤ TO BE BUILT IN PHASE I
■ TO BE BUILT IN PHASE II
206,260 S.F. TO BE BUILT IN PHASE III

P A R K I N G

	PHASE I	PHASE II	PHASE III	TOTALS
FACULTY		256	212	468
STUDENTS COMMUTERS		225	225	450
RESIDENTS		226	226	452
FLIGHT TRAINING	196			196
VISITORS		22		22
INDUSTRY R/D			169	169
TOTALS	196	729	832	1759

DRAWING 8

CIRCULATION AND PARKING

THIS DRAWING REPRESENTS A STUDY OF THE TRAFFIC PROBLEMS WITHIN THE SITE.

INFORMATION SHOWN INCLUDES:

A. CAMPUS ENTRY POINTS

B. VEHICULAR AND PEDESTRIAN CIRCULATION PATTERNS

C. SERVICE ACCESS ROADS AND LANDING POINTS.

D. PARKING SPACES WITH INDICATION OF USERS: FACULTY, STUDENTS OR VISITORS.

E. ROAD AND PARKING DIMENSIONS.

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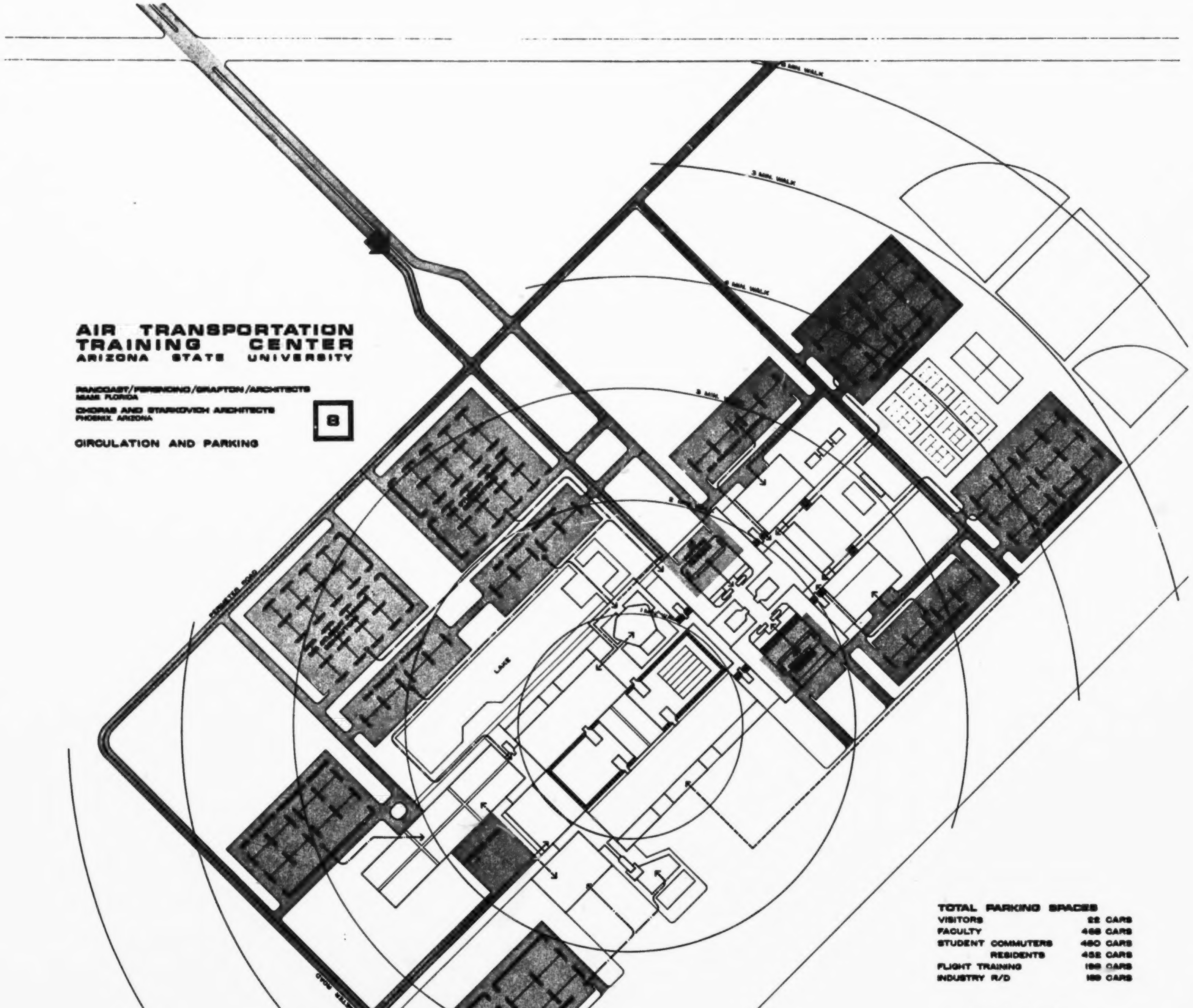
8

CIRCULATION AND PARKING


3 MIN. WALK
3 MIN. WALK
2 MIN. WALK
3 MIN. WALK
2 MIN.
1 MIN.
LAKE
PERIMETER ROAD
PERIMETER ROAD

TOTAL PARKING SPACES	
VISITORS	22 CARS
FACULTY	466 CARS
STUDENT COMMUTERS	460 CARS
RESIDENTS	452 CARS
FLIGHT TRAINING	196 CARS
INDUSTRY R/D	169 CARS

GENERAL NOTES
1 MINUTE WALK 280 FT.
PERIMETER ROAD 48 FT. WIDE
SECONDARY ROADS 24 FT. WIDE
PARKING STALL 10X20 FT.

LEGEND
——— PEDESTRIAN TRAFFIC
- - - - SERVICE TRAFFIC

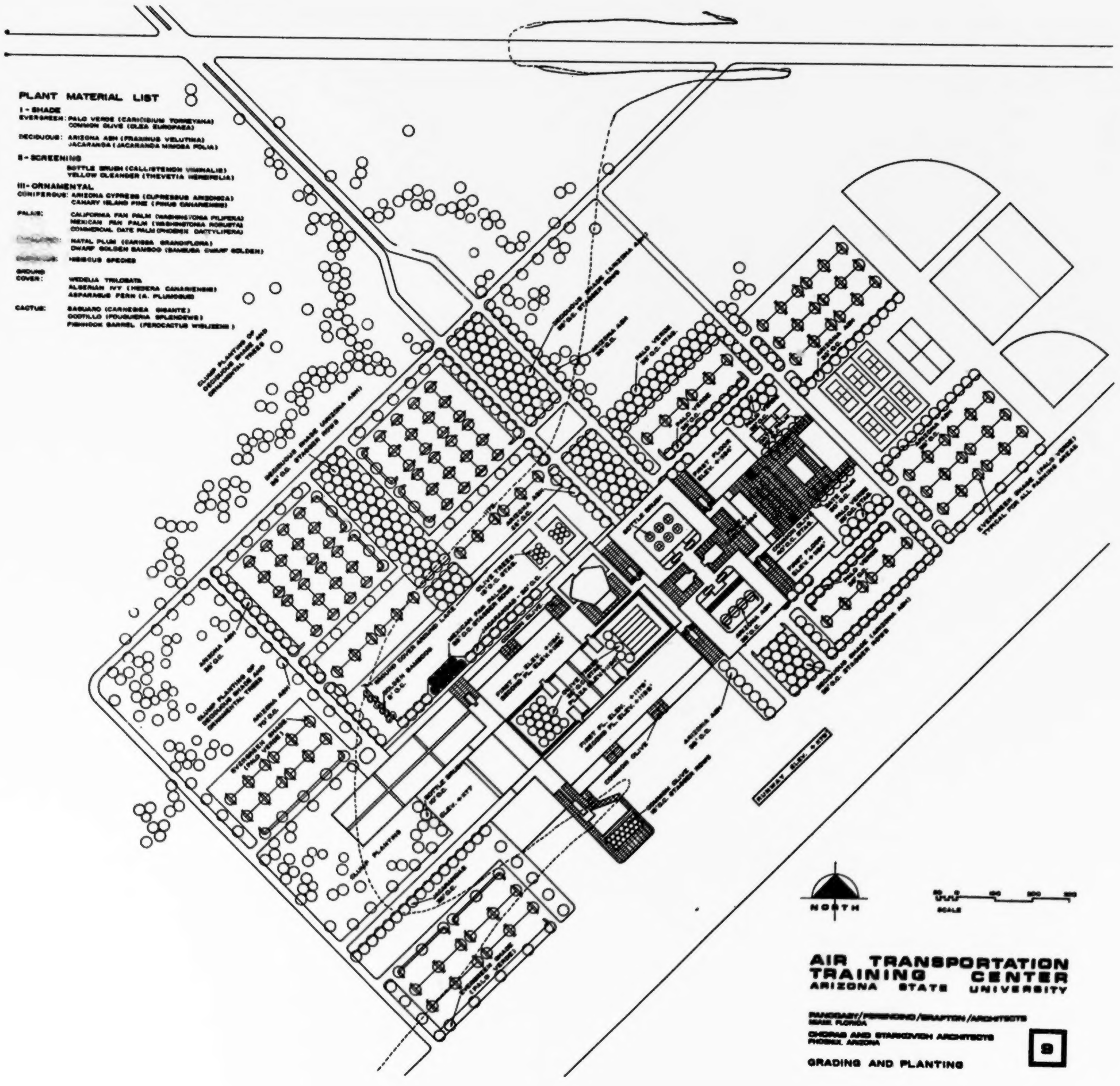
DRAWING 9

GRADING AND PLANTING

THIS DRAWING ILLUSTRATES:

A. THE GRADING DESIGN CONCEPT WITH INDICATION OF NEW CONTOURS AND THEIR RELATION TO THE EXISTING GRADES.

B. THE FUNCTIONAL USE OF PLANT MATERIAL WITH THE EXPRESSION OF THE EFFECT TO BE ACHIEVED.



PLANT MATERIAL LIST

I - SHADE
EVERGREEN: PALO VERDE (CARICIDIUM TORREYANA)
COMMON OLIVE (OLEA EUROPAEA)

DECIDUOUS: ARIZONA ASH (FRAXINUS VELUTINA)
JACARANDA (JACARANDA MIMOSA FOLIA)

II - SCREENING
BOTTLE BRUSH (CALLISTEMON VIMINALIS)
YELLOW OLEANDER (THEVETIA NEREIFOLIA)

III - ORNAMENTAL
CONIFEROUS: ARIZONA CYPRESS (CUPRESSUS ARIZONICA)
CANARY ISLAND PINE (PINUS CANARIENSIS)

PALMS: CALIFORNIA FAN PALM (WASHINGTONIA FILIFERA)
MEXICAN FAN PALM (WASHINGTONIA ROBUSTA)
COMMERCIAL DATE PALM (PHOENIX DACTYLIFERA)

[illegible]: NATAL PLUM (CARISSA GRANDIFLORA)
DWARF GOLDEN BAMBOO (BAMBUSA DWARF GOLDEN)

[illegible]: HIBISCUS SPECIES

GROUND COVER: WEDELIA TRILOBATA
ALGERIAN IVY (HEDERA CANARIENSIS)
ASPARAGUS FERN (A. PLUMOSUS)

CACTUS: SAGUARO (CARNEGIEA GIGANTEA)
OCOTILLO (FOUQUIERIA SPLENDENS)
FISHHOOK BARREL (FEROCACTUS WISLIZENI)

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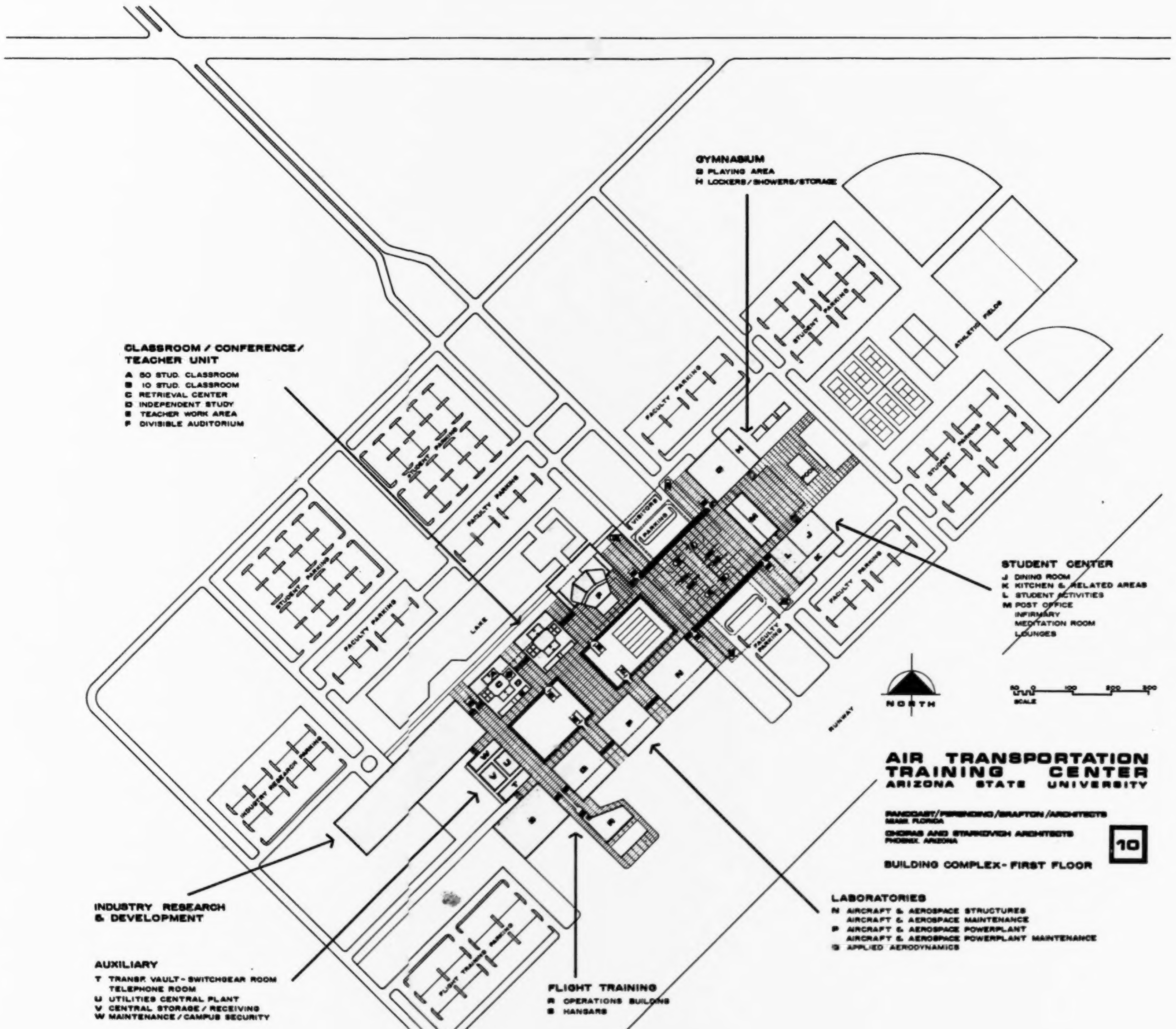
GRADING AND PLANTING

9

DRAWINGS 10, 11, AND 12

BUILDING COMPLEX - 1ST, 2ND AND 3RD FLOOR PLANS

IN THESE DRAWINGS, THE USE OF EACH SPACE AND THE SEQUENCE OF SPACES ON EACH FLOOR ARE SHOWN. THEY REPRESENT THE SCHEMATIC DESIGN OF THE FACILITIES.


GYMNASIUM
G PLAYING AREA
H LOCKERS/SHOWERS/STORAGE
CLASSROOM / CONFERENCE/ TEACHER UNIT
A 50 STUD. CLASSROOM
B 10 STUD. CLASSROOM
C RETRIEVAL CENTER
D INDEPENDENT STUDY
E TEACHER WORK AREA
F DIVISIBLE AUDITORIUM
STUDENT CENTER
J DINING ROOM
K KITCHEN & RELATED AREAS
L STUDENT ACTIVITIES
M POST OFFICE
INFIRMARY
MEDITATION ROOM
LOUNGES
ATHLETIC FIELDS
STUDENT PARKING
FACULTY PARKING
VISITORS PARKING
LAKE
RUNWAY
INDUSTRY RESEARCH PARKING
FLIGHT TRAINING PARKING
NORTH
50 0 100 200 300
SCALE
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10
BUILDING COMPLEX - FIRST FLOOR
LABORATORIES
N AIRCRAFT & AEROSPACE STRUCTURES
AIRCRAFT & AEROSPACE MAINTENANCE
P AIRCRAFT & AEROSPACE POWERPLANT
AIRCRAFT & AEROSPACE POWERPLANT MAINTENANCE
Q APPLIED AERODYNAMICS
INDUSTRY RESEARCH & DEVELOPMENT
AUXILIARY
T TRANSF. VAULT - SWITCHGEAR ROOM
TELEPHONE ROOM
U UTILITIES CENTRAL PLANT
V CENTRAL STORAGE / RECEIVING
W MAINTENANCE / CAMPUS SECURITY
FLIGHT TRAINING
R OPERATIONS BUILDING
S HANGARS

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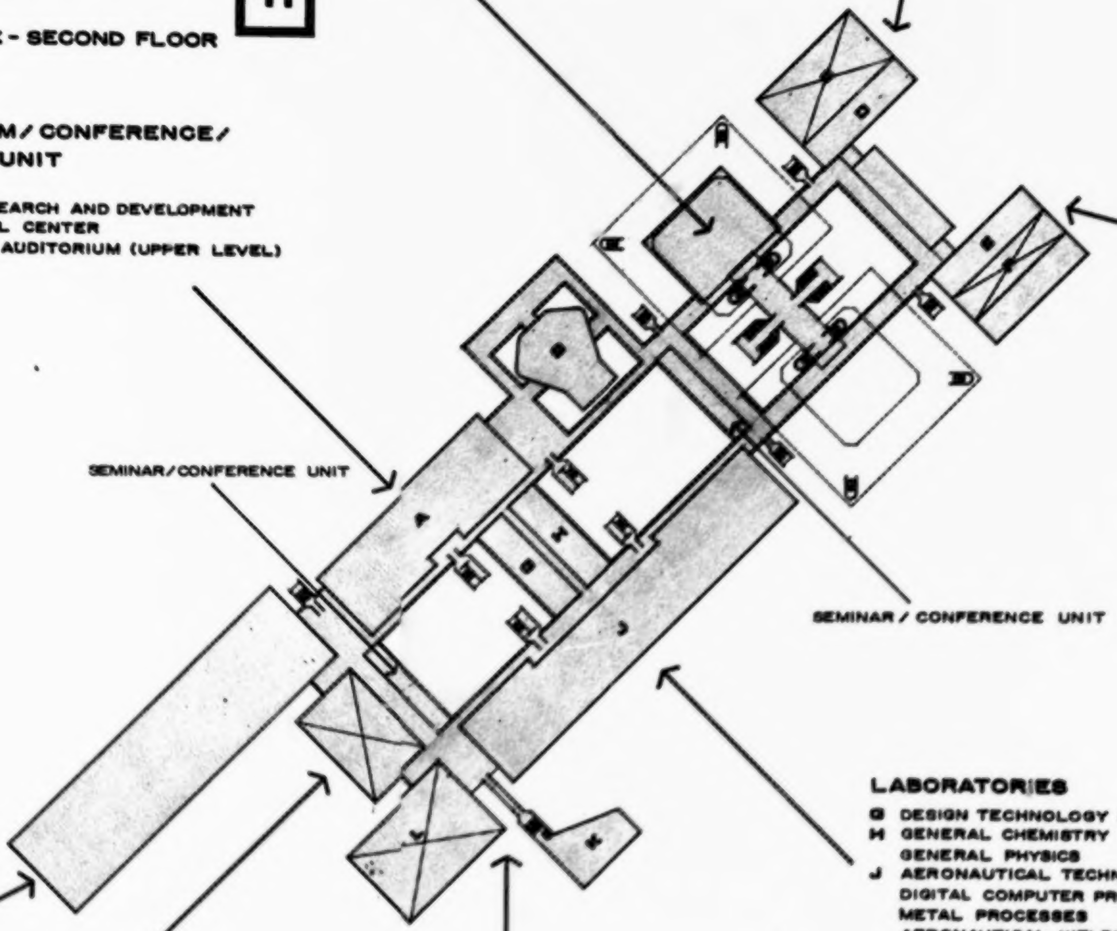
11

BUILDING COMPLEX - SECOND FLOOR



ADMINISTRATION

GYMNASIUM
C PLAYING AREA (UPPER LEVEL)
D ACTIVITIES AREA

STUDENT CENTER
E MEETING ROOMS
F DINING ROOM (UPPER LEVEL)

CLASSROOM / CONFERENCE / TEACHER UNIT
A LIBRARY
BASIC RESEARCH AND DEVELOPMENT
AUDIOVISUAL CENTER
B DIVISIBLE AUDITORIUM (UPPER LEVEL)

SEMINAR/CONFERENCE UNIT

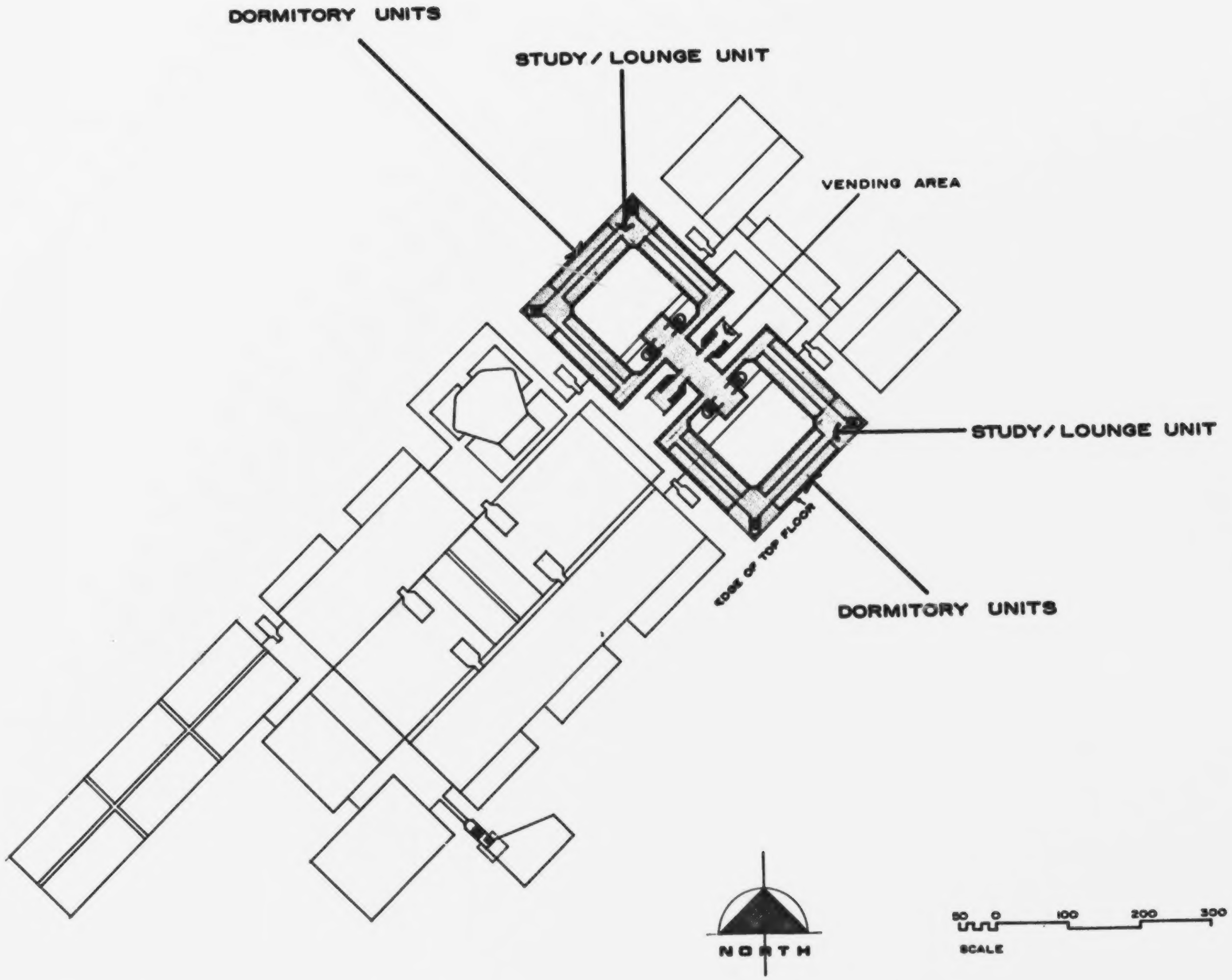
SEMINAR / CONFERENCE UNIT

LABORATORIES
G DESIGN TECHNOLOGY COURSES
H GENERAL CHEMISTRY
GENERAL PHYSICS
J AERONAUTICAL TECHNOLOGY
DIGITAL COMPUTER PROGRAMMING
METAL PROCESSES
AERONAUTICAL WELDING
ELECTRONIC TECHNOLOGY
MECHANICAL ENGINEERING COURSES

INDUSTRY RESEARCH & DEVELOPMENT

AUXILIARY (UPPER LEVEL)

FLIGHT TRAINING
K OPERATIONS BUILDING
L HANGARS (UPPER LEVEL)


DORMITORY UNITS
STUDY / LOUNGE UNIT
VENDING AREA
STUDY / LOUNGE UNIT
EDGE OF TOP FLOOR
DORMITORY UNITS
NORTH
50 0 100 200 300
SCALE

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12

DORMITORIES - TYPICAL

DRAWING 13

ELECTRICAL AND COMMUNICATION DISTRIBUTION SYSTEM

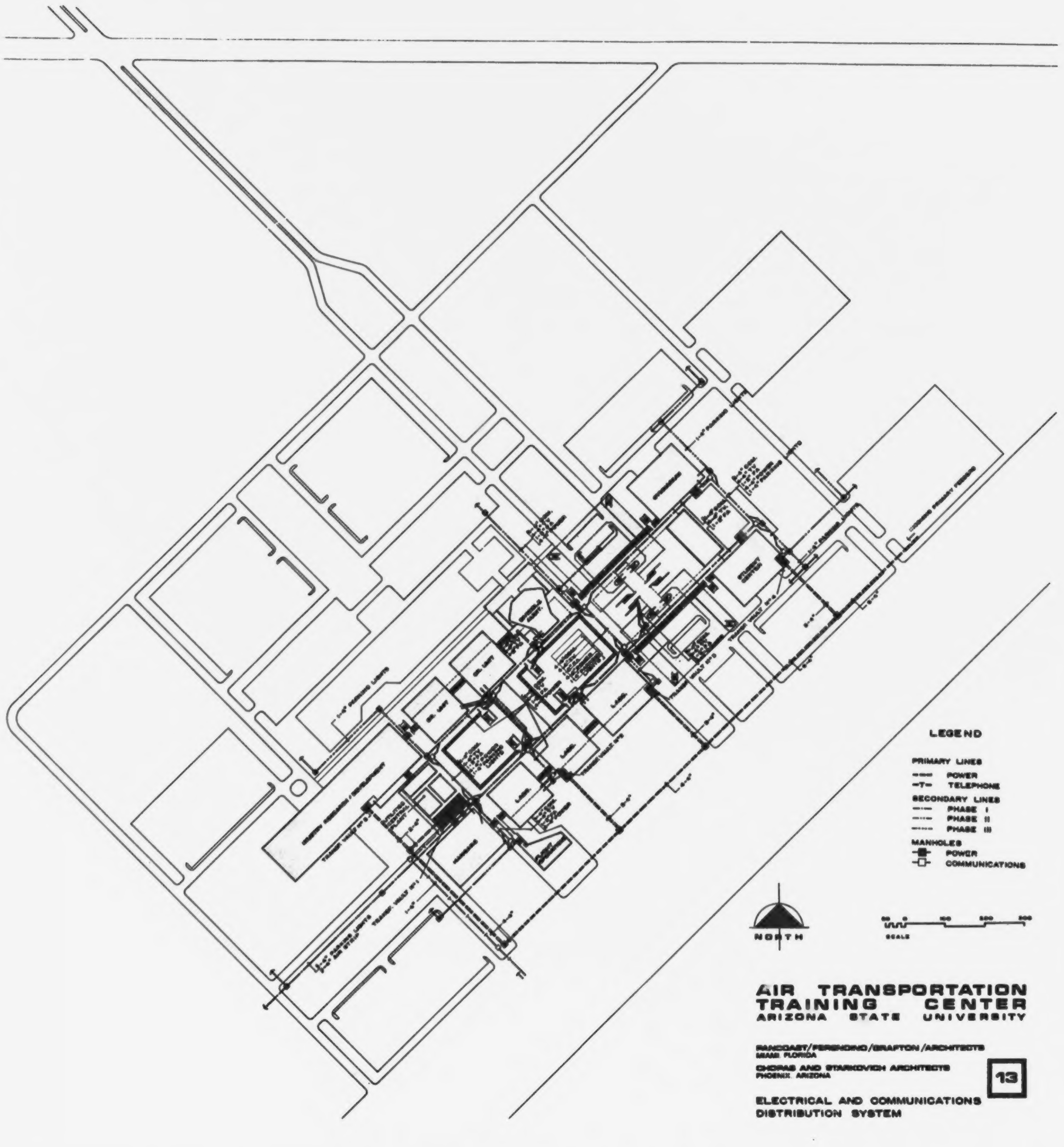
THIS DRAWING ILLUSTRATES THE BASIC CONCEPT FOR HANDLING THE ELECTRICAL AND COMMUNICATION SERVICES TO THE CAMPUS.

THE INFORMATION SHOWN INCLUDES:

A. SCHEMATIC LAYOUT OF THE PRIMARY INCOMING SERVICE AND PRIMARY LOOP

B. LOCATION OF TRANSFORMER VAULTS, SWITCHGEAR AND TELEPHONE ROOMS.

C. SCHEMATIC LAYOUT OF THE MAIN DISTRIBUTION LINES (SECONDARY) WITH INDICATION OF DUCT ROUTES AND SIZES, AND LOCATION OF MANHOLES.


LEGEND
PRIMARY LINES
POWER
-T- TELEPHONE
SECONDARY LINES
PHASE I
PHASE II
PHASE III
MANHOLES
POWER
COMMUNICATIONS
NORTH
50 0 100 200 300
SCALE

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13

ELECTRICAL AND COMMUNICATIONS
DISTRIBUTION SYSTEM

DRAWING 14 AND 15

MECHANICAL DISTRIBUTION SYSTEM

THESE DRAWINGS ILLUSTRATE THE BASIC CONCEPTS FOR HANDLING THE MECHANICAL SERVICES TO THE CAMPUS.

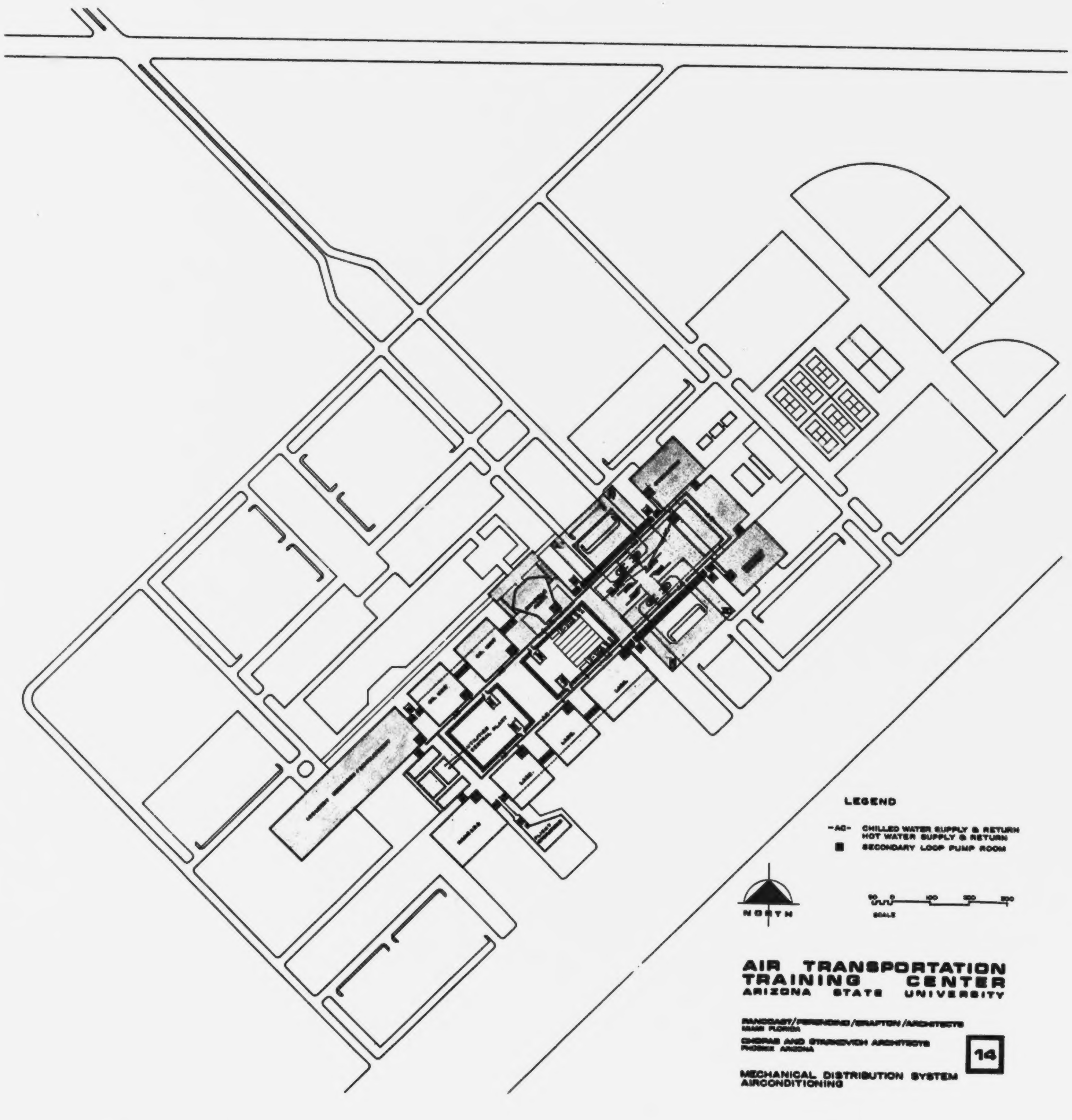
THE INFORMATION SHOWN INCLUDES THE FOLLOWING SERVICES:

A. DOMESTIC WATER

B. FIRE WATER (LINES & HYDRANTS)

C. CHILLED AND HOT WATER LINES (SUPPLY AND RETURN)

D. SANITARY SEWER.


UTILITIES CENTRAL PLANT
LAB.
LEGEND
-AC- CHILLED WATER SUPPLY & RETURN
HOT WATER SUPPLY & RETURN
■ SECONDARY LOOP PUMP ROOM
NORTH
50 0 100 200 300
SCALE

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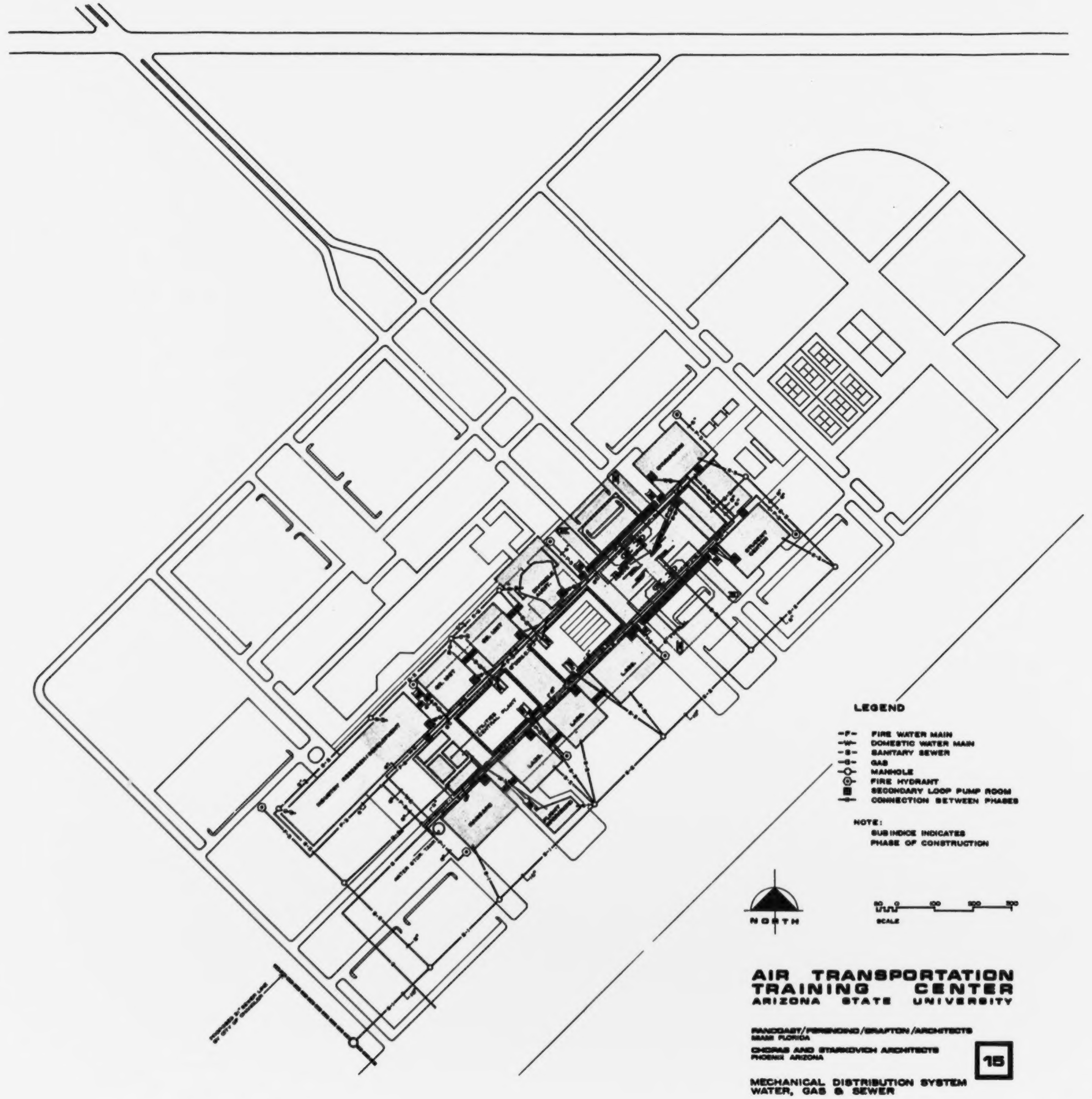
14

MECHANICAL DISTRIBUTION SYSTEM
AIRCONDITIONING



LEGEND

-F-	FIRE WATER MAIN
-W-	DOMESTIC WATER MAIN
-S-	SANITARY SEWER
-G-	GAS
-○-	MANHOLE
◎	FIRE HYDRANT
▣	SECONDARY LOOP PUMP ROOM
-+-	CONNECTION BETWEEN PHASES

NOTE:
SUBINDICE INDICATES
PHASE OF CONSTRUCTION

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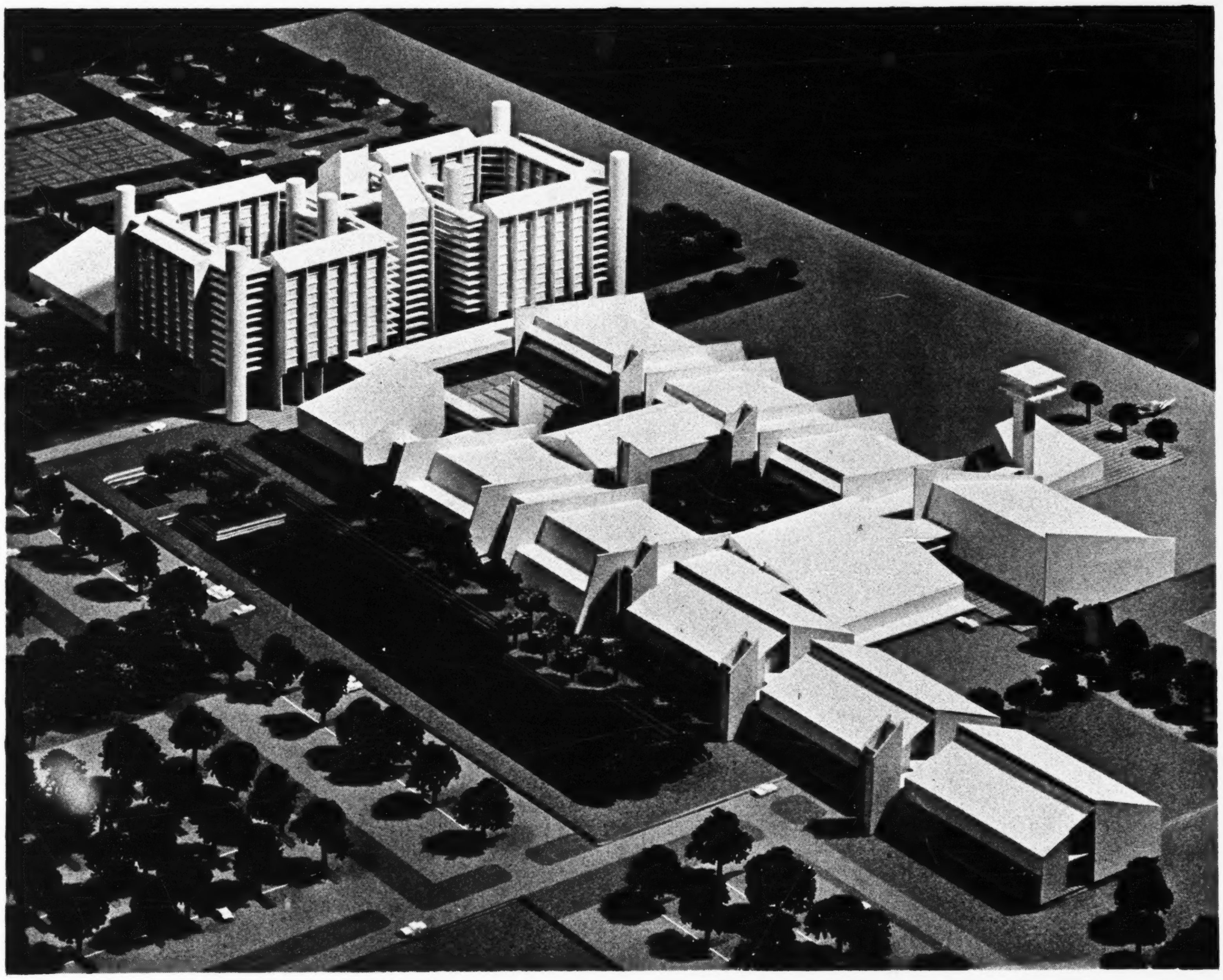
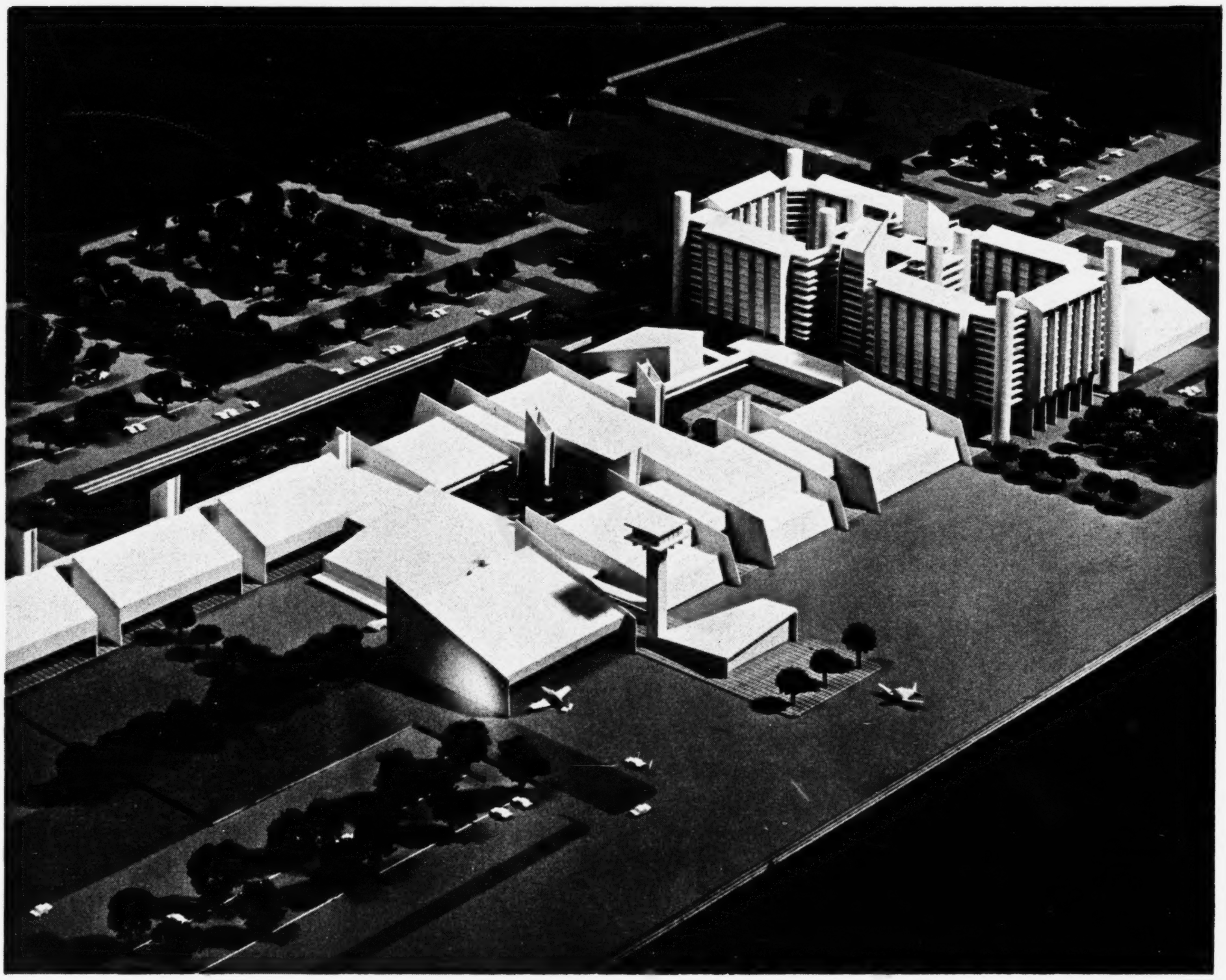
15

MECHANICAL DISTRIBUTION SYSTEM
WATER, GAS & SEWER



AERIAL VIEW OF SCALE MODEL FROM THE WEST

PROMINENT FEATURES: HIGHRISE DORMITORIES AT THE UPPER LEFT, INTERIOR MALL, "PRADO," AND LAKE IN THE CENTER AND CONTROL TOWER AT RIGHT.



AERIAL VIEW OF SCALE MODEL FROM THE RUNWAY SIDE

PROMINENT FEATURES: FLIGHT TRAINING CENTER WITH OPERATIONS CONTROL TOWER AT THE CENTER.